

Modern PHOTOGRAPHY

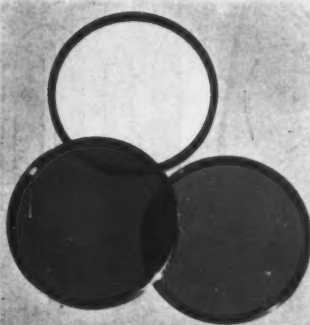
CENTS NOVEMBER 1961

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FINE ARTS

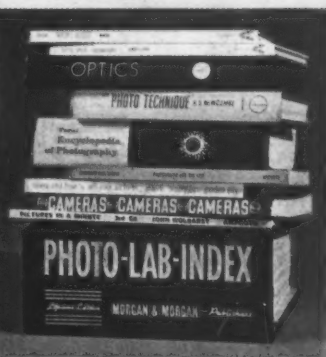
**EXCLUSIVE! THE
FIRST OFFICIAL
DEPTH-OF-FIELD
TABLES FOR ALL
35MM CAMERAS &
LENSES FROM 21
ALL THE WAY TO
1000MM MAXIMUM**



**OUR AG-1 FLASH
BULB MESS: HOW
CHECK BULBS
FULLY TEST
FLASHGUN
BRIGHTNESS
US BEST EVEN
VERING POWER**



**MODERN'S ANNUAL
GUIDE TO COLOR
FILMS & FILTERS
KEEP YOUR SHOTS
IN RIGHT COLOR
BALANCE IN ALL
PICTURE TAKING
TIMES & PLACES**



**BABES AND BABIES
THOMAS HOPKER
PHOTOGRAPHS BIG
ONES WHILE OUR
EDITORS SHOOT
THEIR OWN KIDS
USING BOTH 35MM
AND 2 1/4 CAMERAS**



**THE DRY ROT IN
PHOTO BOOKS &
HOW TO TELL A
GOOD ONE FROM
A USELESS DOG
PLUS A LIST OF
TITLES MODERN
CAN RECOMMEND**

**SEA FOR REAL
COL EVENINGS:
AST YOUR COL-
PICTURES LIKE
MARSHMALLOW
SEE THE WEIRD
AZING RESULTS
U CAN ACHIEVE**



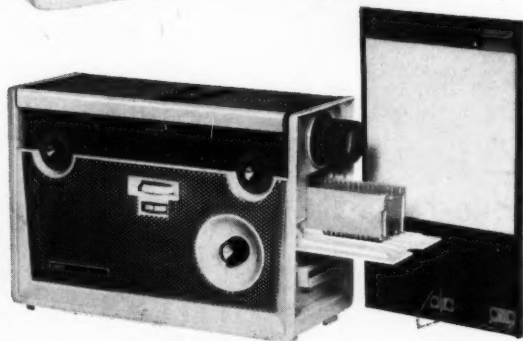


BIG "NEWS" from ANSCO



NEW! The Anasco Autoset 35mm Camera

Fully automatic exposure control over a *wide range* of exposure conditions. Film speed settings from 6 to 1600, with shutter speeds automatically adjusted from 1/30 to 1/800 second. Optional manual control. Highly corrected Rokor f:2.8 lens. Special "freeze button" permits setting exposure close up to principal subject in backlight scene. Constant working exposure signal in viewfinder tells in advance if light is sufficient. Combination coupled rangefinder-viewfinder is parallax corrected bright frame type - easy to use, even when wearing glasses. Semi-automatic flash exposure settings. Be sure to see this value-packed automatic before you buy any camera. Anasco Autoset is priced at less than \$90.00, with case less than \$10.00 extra.

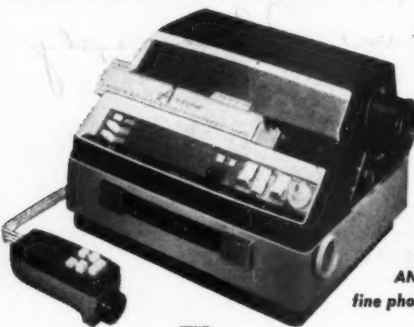


NEW! The Anasco Regent® 35mm Projector

This 500-watt, high styled projector handles all 2 x 2 slides in any type of mount. Operates automatically by remote control or at machine. Fast, "pop-up" editing. Preview projection screen inside cover. Uses low cost Anasco Tag Along® trays for continuous slide projection. Coated f:3.5 projection lens. Modern, functional design for easy carrying. Complete with one tray, less than \$80.00. Remote control accessory cord, less than \$6.00.

NEW! The Anscomatic II 35mm Projector

The new, de luxe version of the famous Anscomatic projector. New *complete* remote control system incorporating remote focusing, forward and reverse control, and hand-held light beam pointer. Automatic projection for all 2 x 2 slides in any type mount. Convenient single slide projection for other sizes up to 2 1/4" square. Exclusive 2-way editing. Automatic, autotime or manual. Brilliant 500-watt illumination. A big value at less than \$140.00. The familiar Anscomatic projector still available at less than \$120.00.



See these great new
ANSKO items wherever
fine photo equipment is sold.

Ansko

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Push three
can work
action with

POLAROID®

SNAP

SNAP

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JAN 25 1962

FINE ARTS

SNAP

SNAPSHOT!

Push three buttons and get a perfect picture in 10 seconds! You don't focus, yet pictures are always sharp. (In portrait position, you can work as close as 30".) No adjusting for light. The electric eye automatically selects and sets the right exposure. Even stops fast action with speeds close to 1/1000th in bright sun. It's a completely new kind of Polaroid Land Camera: the 10-Second Automatic.

ANNOUNCING...

the only 8mm camera with a reflex sensing system that makes f/stop changes even while you zoom.

NEW BELL & HOWELL REFLEX ZOOMATIC with OPTRONIC EYE!

Behind the lens... continuously operating. That is the big news about the radically new Optronic Eye system. Not only does the Reflex Zoomatic's new system give you single lens reflex viewing, but the Optronic Eye continuously senses and sets for only the light entering the lens—even as you zoom! Unlike ordinary electric eye cameras, this one cannot be fooled by any light conditions outside the actual scene being captured on film. And with reflex viewing, you see exactly what you are shooting.

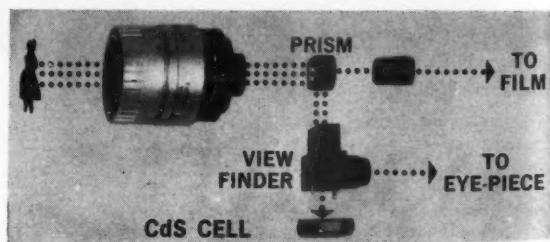
REFLEX OPTRONIC EYE

No other camera can give you such true exposure settings while you are shooting. Even as you zoom from wide angle to tight telephoto, the Optronic Eye makes continuous, fully automatic f/stop adjustments. As conditions demand, it can vary the adjustments from f/1.8 to f/22. You see these changes being made in the viewfinder, while you shoot.

Most important, extraneous "hot spots" and dark areas do not affect the readings.

The heart of the system is an ultra-sensitive cadmium sulfide photocell adapted to photographic needs by Bell & Howell. Because it does not generate energy, but only modifies a steady battery-supplied flow, this new cell demands only 1/100th the light that conventional selenium cells must have.

Seeing the f/stop readings change in the reflex viewfinder also allows you to use the Reflex Zoomatic as a light meter in pre-planning precise settings. This feature actually gives more flexibility than a light meter, since you can take readings of otherwise inaccessible areas simply by zooming.





MANUAL OVERRIDE CONTROLS

Under almost all conditions, this camera will automatically give you the best possible pictures. However, every photographer sooner or later likes to "doctor" zoom speeds and *f*/stop settings. So not only are there *two* separate electrically-powered zoom speeds, but there is a manual zoom bar attachment for special speeds. The power zoom operates without transporting film, so that you can check critical focusing within a scene, and also take exact light readings for manual exposure settings in a high-contrast scene.

Fade effects are achieved with a manual override ring located at the base of the lens barrel.

4-TO-1 ZOOM RATIO

Focal lengths range from 9mm to 36mm. Entire range will focus from 3 feet to infinity. At 3 feet, you can zoom in and cover an area as small as 3" x 4".

See the new Reflex Zoomatic with Optronic Eye at your Bell & Howell Dealer's. Look at it. Try it. Get the feel of it. Whether you are about to buy an 8mm or not, you will find this one to be a truly impressive camera.

Bell & Howell

FINER PRODUCTS THROUGH IMAGINATION

TECHNICAL DATA

Dimensions: 5¼" x 7½" x 3¼". **Weight** (with batteries): 5 lbs. 3 oz. **Lens:** Magnesium Fluoride Coated. **Speed,** *f*/1.8 **Focus range,** 3' to infinity. **Zoom range,** 9mm to 36mm.

Optronic Eye: Cadmium Sulfide photocell operating on resistive principle using steady current supplied by a 1.35 volt mercury battery. **Control range,** *f*/1.8 to *f*/22. Sets for automatic control on film ASA 6, 10, 16, 20, 32, 40. Automatically compensates for single frame exposure, 16 and 48 frames per second.

Viewfinder: Reflex-viewing through taking lens. Ground spot in center for critical focus. Eyepiece adjustable for use with eyeglasses. Iris scale visible in viewfinder.

Zoom Control: Electric power supplied by 4 penlight-batteries. Two speed. Pressure actuated. Operates independent of film transporting mechanism. Automatic motor disengagement for manual control.

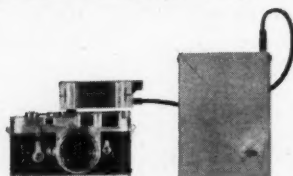
Miscellaneous: Built-in type "A" conversion filter. Lens elements coated for haze filtering. Manual zoom rod stores in camera. Fade control ring located on lens barrel.

Models: Roll loading, Reflex Zoomatic 434. Magazine loading, Reflex Zoomatic 444.

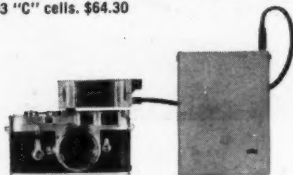
BELL & HOWELL WILL MAINTAIN THIS CAMERA FOR FIVE YEARS—FREE
As unique as the camera is the new assurance of quality you get with it. With the Reflex Zoomatic comes a *Certificate of Excellence*. For the first time, the manufacturer guarantees that, in the event it fails to function properly during normal use, for any reason, you will receive free factory service during the first 5 years of original ownership. Merely ship the camera to Bell & Howell for free service, maintenance and repair. Only batteries and film are not covered.

WATCH "BELL & HOWELL CLOSE-UP!" ON FULL ABC-TV NETWORK

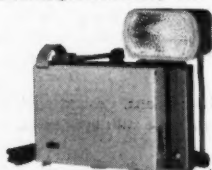
MORE POWER ...PER OUNCEPER INCH BRAUN HOBBY ELECTRONIC FLASH UNITS famous monitor circuit keeps batteries charged longer



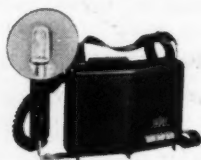
POCKET-PAK F-30 with Kodachrome II Guide:51. Wide-angle head so tiny you hardly know it's on the camera. Hip-pocket size pack with power of bulkier, costlier units. Exclusive monitor keeps output at maximum; drains batteries only as capacitor recharges itself. With four Eveready E93 "C" cells. \$64.30



POCKET-PAK F-60...with rechargeable nickel cadmium batteries that are interchangeable (you can carry a spare). Same light output as the F-30, and it weighs even less. \$79.50



SPECIAL EF-2 NC. Kodachrome II Guide:72. Special design for advanced amateur and many professional applications. Rechargeable nickel cadmium battery is permanently installed. Tiny reflector throws 60° beam. Accepts extension heads. Built-in charger. \$109.50



AUTOMATIC EF-3...Kodachrome II Guide:96. Exclusive push-button control of all functions: instant switchover from A.C. to storage battery, from full to half-power light and to built-in charger. Extension heads available. \$109.50

At your Leica dealer...or write for information.

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modern PHOTOGRAPHY

NOVEMBER 1961, VOL. 25, NO. 11

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AUGUSTUS WOLFMAN, Ed.-in-Chief

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DOUBLE-TAKE LEICA LEICINA

THE CLASSIC 35MM STILL CAMERA

PICK UP AN M-3 OR AN M-2 AT YOUR LEICA DEALER. You'll do a double-take as you react to the famous Leica "feel." It's a legend among 3 generations of photographers...the magic of Leica design that makes it a "perfect fit" for combined action of hand, brain and eye. And...as you try it, you'll see why its rangefinder is accepted as the fastest and most precise, even in lowest light levels where others fail. Yet, in just 10 seconds (with Visoflex II) the same Leica camera becomes the most accurate eye-level reflex made. A **test focus** in every lens range will show you why Leica is the world's most versatile 35mm camera for every kind of picture...from extreme close-up through telephoto.

47651

FULLY ELECTROMATIC 8MM MOVIE CAMERA

PICK UP A NEW LEICINA. You'll discover that the Leica "feel" now has a **double meaning** as it takes its place in 8mm movie-making. Exclusive 3-POINT RIGIDITY makes Leicina the first to overcome hand-held camera movement. (Without this steadiness, the finest features of any camera can't produce needle-sharp movies.) The gadget-free exterior fits snugly in your palm; eyepiece **below** permits forehead brace **above**. Pushbutton **away from the camera body** in fold-down handle eliminates jarring when you press. It's always ready for action at the touch of a button. From the whispering whirr of its electric motor drive to the discretely built-in automatic exposure control, Leicina is a new kind of movie camera that's built today, for tomorrow.

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LEICINA





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you get perfect movies

NIKKOREX-8

new, fully automatic, by Nikon

Absolutely the quickest, easiest way to get perfect movies! It's a camera you can have with you at all times—tucked away in your breast pocket—always ready to shoot. Or if you're thinking of someone to whom most cameras are "too complicated"—remember the automatic Nikkorex-8 takes perfect movies by simply pushing a button.

NO EXPOSURE SETTINGS Cadmium Sulphide electric eye automatically sets diaphragm, or you set it manually, if you choose.

NO DISTANCE SETTINGS Fixed-focus f1.8 Nikkor is sharp from 3 feet to infinity—accepts 2X magnification f1.8 telephoto lens attachment.

NO SPRINGS TO WIND Electric motor runs camera on 4 standard penlite batteries.

The new Nikkorex-8 is smartly attractive and attractively priced. Slim, compact—it slips easily into pocket or handbag—goes with you everywhere. Costs you less than \$80 at your photo dealer. For your Free copy of *Perfect Movies Without Knowing How*, write to Dept. MP-11.



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Coffee Break WITH THE EDITORS

THIS MONTH'S COVER . . .

The square in the top left-hand corner of our chessboard represents depth of field (or the lack of it), and the official tables on pages 91 through 106 will tell you, among many other things, precisely at what distance, with what aperture and with what 35mm camera lens you could get the king and queen to look sharp. Moving right one square and down one square, some AG-1 bulbs are caught by Myles Adler in the act of sympathetic flash—for more about that and AG-1's in general, turn to page 80. Now right one and up one square to some filters, introducing our annual guide to color film filters on page 86. Right one and down one to some photo books that MODERN's editors rate as sound, page 70. Left one and down one to an indoor portrait by Thomas Hopker, taken with a Leica M2 and 90mm Summicron at f/2, 1/60 on old Tri-X; for more of Hopker's girl pictures, see page 82. Finally, left one and down one, what looks like a Cubist painting is actually a sandwich of two slides—one of a tree, another of a quilt—by color experimenter S. C. Valastro. For more about this and his other experiments, see page 72.

ON THE ROAD: BACKTRACKING . . .

In the September "Coffee Break" we ran a report on executive editor Burt Keppler's travels as a speaker on photography ("On The Road"). Being dazzled by the speed of his movements, we omitted to mention that the Asilomar Photojournalism Conference was sponsored by the American Society of Magazine Photographers.

. . . AND ONWARD AGAIN . . .

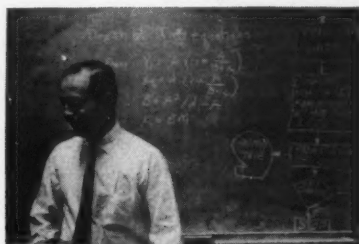
While we're on the subject of MODERN editor/speakers, note that movie editor Mike Matzkin spoke or is speaking (it depends how early you got this issue) at the PSA Convention in New York, 27 to 30 September, in the special Four-Day Course in Advanced Film Making. Matzkin's talk is on "New Possibilities for 8mm."

DEPUTED TO COMPUTE IT . . .

Although many members of MODERN's staff were embroiled in proofreading our new depth-of-field tables (the sea of figures between pages 91 and 106), and although MODERN's technical consultant Bennett Sherman had the job of furnishing the equations and circle-of-confusion dimensions on which the tables are based, the actual chore of

calculation was done by an outside editorial assistant called IBM 7090.

This chap is an incredibly fast and accurate worker, but he does need a lot of guidance and supervision—which in this case were given him by Charles G. Cooper of Computer Applications, Inc. For one thing, IBM 7090 doesn't understand English, so his instructions—or program—for computing our tables had to be put into a language called FORTRAN, which is short for "formula translation." This



Charles G. Cooper prepares our depth-of-field formulas (on board) . . .



EDWARD MEYERS

. . . for IBM 7090, one of this bank of electronic computers.

job took about three days. The program was then fed to IBM 7090 to see if he made sense of it, which he did. This job took 7 minutes.

Now that IBM 7090 had his instructions on how to work, all he needed was the information to work on, which was keypunched onto IBM cards. Here we'd better let Mr. Cooper do the explaining. "The information consisted of some 23 aperture numbers which we've identified in the equation (see page 92) as parameter E," he says. "The focal length in mm was punched as 29 distinct values, and this served as parameter A in the equation. There were 14 numbers for the distances (D) and 2 for the blur distance (M)." (As we point out in the introduction on page 92, the complete tables incorporating all those values will be published separately: to allow space for other (Continued on page 10)

automatic fire power!



exemplifies the almost unlimited versatility of the Nikon F

It is a mistake to think of the Nikon Electric Motor Drive as an *accessory* to the Nikon F. For, when the two are joined, an entirely new medium emerges — a medium that endows its user with an ability to soar far above the commonplace in photographic expression.

Rapid sequence photography, time-lapse and motion study are among the more obvious applications for the motor-equipped Nikon F. No less dramatic is the new scope it brings to the creative aspect of photography. It frees the user from the mechanics of camera manipulation, enables him to capture split-second action, fleeting expressions, unpredictable momentary occurrences — pictures he could not have otherwise obtained.

The motor-equipped Nikon F is an incredible tool. Battery-powered, it can be operated in-hand or remotely, or it can be fired by radio control, inter-

valometer, photo-cell relay or other triggering device. It advances the film, winds the shutter and makes the exposure, automatically. It can be set to shoot singles or bursts, or to fire continuously through an entire load of film — at any rate, up to 4 exposures per second.

Even if you have no special, immediate need for the electric motor drive, you cannot but be impressed by the skill and ingenuity evident in its design. You cannot but marvel at the stamina of the Nikon F — its ability to withstand the continuous action of the motor for thousands of exposures, and continue to perform and respond with the smooth, impeccable precision that marked its performance with the very first roll of film.

See the motor-equipped Nikon F at your Franchised Nikon Dealer today. For complete details, write to Dept. MP-11.



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tinue shooting. Uses 4 "D" cells, costing
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bracket, or detach-
tiny head and mount
on camera. Nickel
cadmium battery...
power saving circuit
... extension cord
charging unit... low-
est recycling time...
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ever. See your dealer.



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COFFEE BREAK

(Continued from page 8)

features in this issue, we had to make
a practical selection of values.)

IBM 7090 grasped all this far more
quickly than we ever could, and within
five minutes he'd rattled out pairs of
near and far distances for every one
of the 14 focusing distances at every
one of the 23 apertures for every one
of the 29 focal lengths. Of course, he
gave this information in his own
language, but it was a fairly simple
matter to run it through a special
machine that translated it into Eng-
lish. Including the time it now took for
Computer Applications to tidy up all
the results, the whole procedure lasted
about one week. As you can see, things
would really be speeded up if someone
could teach IBM 7090 English.

FROM THE HOUSE OF TIME . . .

In our August issue we published
a group of symbolic photos by Clarence
John Laughlin and invited readers to
tell us what they thought of them.
Among the many letters we received
for and against Laughlin (see page
11 for a selection), there was one from
J. L. Cap Beckley of Houston, Texas,
who remembered having met Laughlin
in New Orleans way back in 1935 and
enclosed a picture he had taken of the



J. L. CAP BECKLEY

Laughlin at work, 26 years ago.

young photographer at work (above).
We noted with interest that Laughlin
was then shooting in the same ceme-
tery that he returned to in 1956 for his
picture *Mars in the House of Time*
(page 62 in the August issue). In
photographing the same place across
a span of 21 years, Laughlin demon-
strates that "the mystery of time" is
indeed (as he wrote) one of his "con-
stant themes and preoccupations."

YOU HAD A PREVIEW . . .

In the April 1961 MODERN we ran
a six-page feature on how amateur
movie maker Ernst Wildi shot and
edited *Water's Edge*. We also men-
tioned that it had won a number of
amateur festival awards. Well, the
movie has now attained professional
success. It's been blown up from 16
to 35mm and is currently at neighbor-
hood theaters. It's being distributed
by George K. Arthur.—THE END

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the negative carrier. This means you filter
the light, NOT the projected image...you
don't project dust and scratches. Result...
superb enlargements, both color and black
and white. Then there's the exclusive self-
masking negative carrier...makes the
DURST 606 ideal for all sub-
miniature to 2 1/4" x

2 1/4" sizes and lets
you crop at the
negative stage. What
other enlarger
offers these two
features plus double
condensers, adjustable
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and a rotatable head for extra-large
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wall projection
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MODERN PHOTOGRAPHY

LETTERS TO THE EDITOR

More Far-flung Readers

I am enclosing photographs taken and printed by me. May be they are not so nice enlargements to take place in your columns. But my second-hand enlarger—better to say twenty-second-hand—can do only these. I hope you would kindly give me an answer, or at least an advice, like "Please leave to take photographs as soon as possible."

Batman, Turkey Ismail Kafescioglu



We certainly don't advise Mr. Kafescioglu to leave off taking photos! Incidentally, his caption to the picture above reads: "Charged with stealing jam from the kitchen; and sentenced to jail for two hours, at home, by her honor the Mother, during the playtime. Taken with an old model of Leica, borrowed from a friend, which I couldn't remember the type. With $f/3.5$ lens, at $1/50$, and $f/8$ on Kodak Plus-X film, in the near evening, in Jerusalem, Israel."—ED.

Where, Oh Where?

Liked the picture of the baseball spectators pages 74 and 75 of your September issue—but, like, who took it? I couldn't find the photographer's credit anywhere.

New York, N.Y. Jay Herbert

That's because it was, like, nowhere. The shot was made by New York freelance Len Gittleman as part of an assignment for the New York Times Magazine. Our heartfelt apologies to all of the readers who have written in to inquire; and to Mr. Gittleman.—ED.

Laughlin: Lauded and Lambasted

In your August issue you ask readers to report their reactions to the photography of Clarence John Laughlin. These are wonderful pictures. There is as much difference between these

(Continued on page 12)

NOVEMBER, 1961

What's the Big difference

in the new
fully automatic
Electronic Eye
FUJICA ZOOM 8?



The Big difference in the viewfinder.

FUJICA's picture window viewfinder is built like a fine lens. The scene you preview is bigger, brighter and flicker-free. You can keep both eyes open without squinting and if you wear glasses, you don't have to take them off. Check this against the most expensive movie cameras at your dealer.

The Big difference in the electric eye.

Compare the size of FUJICA's electric eye with any other automatic movie 8. It is larger . . . generates extra power. This automatically opens up or closes down the lens opening faster as you follow the action from a sunlit scene into dark shade. No more over exposed or under exposed film.

The Big difference in the ZOOM lens.

The FUJINON $f/1.8$ ZOOM lens is based on advanced optical principles. The internal lens elements ZOOM, not the outside housing. Result . . . every scene you shoot is in sharp focus . . . this is automatic at all of the infinite number of ZOOM positions. The lens housing is sealed. No dust or dirt can ever rough up the smooth action when you ZOOM from wide angle scenics to telephoto closeups. In addition, the speed of the FUJINON $f/1.8$ enables you to take most indoor movies without special lights. A built-in "Stop and Go" signals when there isn't enough light.

What else does a FUJICA have that helps make your every movie a professional show . . . push button switchover from fully automatic to manual. Full automation at 16, 24 and 32 F.P.S. Single frame exposure for titles, trick and stop-motion effects.

Your camera dealer will be pleased to show you the Big difference in the new fully automatic FUJICA.

Less than \$130

Hand grip . . . less than \$7.00

Write for FREE booklet, "FUJICA ZOOM movie cameras and projectors."



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In Canada: FUJI Precision Cameras of Canada Ltd., 5385 Paree Street, Montreal 9, P. Q.

There has never
been an
8mm movie camera
like it...

your assurance
of getting
the most
wonderful pictures
in the world!



CARENA ZOOMEX...

outclasses...outperforms...outdates
all other 8mm movie cameras.
Fabulous Angenieux F1.8 Zoom lens
gives 7½mm to 35mm Zooming range!
Consistent 16mm quality
with all the advantages of 8mm.
Carena's fully automatic electric-eye is
powered by latest mercury battery-resistor
circuit...most reliable system today...
see your dealer and be convinced.
Ask for colorful brochure. ***30950**

EXAKTA CAMERA COMPANY, 705 Bronx River Road, Bronxville, N. Y.
In Canada, 579 Richmond St., West, Toronto, Ontario

LETTERS

(Continued from page 11)

pictures and the ordinary documentary or meaningless "gimmick" shot as there is between the original Mona Lisa and a postcard copy. . . . Bloomfield, Iowa Mrs. W. C. Adrian

. . . Frankly, I cannot for the life of me see why any publication should waste time and paper on such stuff. I think it is awful!
St. Petersburg, Fla. W. L. McFarland

. . . It is reassuring to those of us who regard photography as an art form to see work of this stature published in a commercial magazine. It is to be hoped that this is the beginning of a trend.
Kingston, Ontario, Canada J. E. Bain

. . . It's all very well for a person to be different, but when the layman can't understand their intent, then there is a void. He and Dali should get together, they'd have a ball.
Globe, Ariz. A. W. Linn

. . . The black-white photographs and text regarding the brilliant work of Clarence John Laughlin constitute one of the most courageous and intelligent features ever presented in a photography magazine in this country. To serious amateurs and professionals, it is a veritable oasis in the desert.
Chattanooga, Tenn. J. Carter

. . . In my opinion the photography is busy, over-studied and static, in short, archaic. Trick photography, and that is what it is no matter how sincere, seldom comes off. In this case it does not.
Brownsville, Tex. P. Langworthy

And many more. . . . Well, we asked for it. One thing is certain, Mr. Laughlin can arouse controversy.—ED.

Of CdS and Cells

To explain some electronic processes in the layman's language is trying at times. For example: your article *Three Movie Electric Eye Systems*, page 92, July 1961, states, "The more light, the greater the resistance, and the smaller the amount of electricity that flows. . . ." This isn't quite correct.

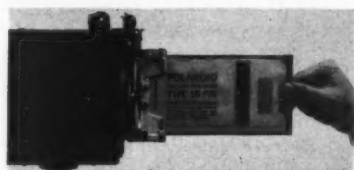
With light, CdS cell resistance decreases and current increases. In the dark, resistance is high—current drain on batteries is low. CdS is a photoconductive device, in reality a light-controlled resistor. Putting more voltage on the cell—within the capability of the cell to dissipate heat and resist voltage breakdown—more current may be "conducted" through the cell to actuate meter movements or relays. Instead of microamperes (one-millionth amp), current as high as tenths of amperes could be controlled by a suitable CdS cell.
Geneva, Ill.

A. E. Toht
Cetron Electronic Corp.



New from Polaroid:

A NEGATIVE IN 20 SECONDS



Now, a further advance in 4 x 5 picture-in-an-instant photography: new Polaroid Land Type 55 P/N film pack develops both print and negative. In just 20 seconds. Outside the darkroom.

Simply load Type 55 P/N film into your Polaroid 4 x 5 Film Holder (fits all press and view cameras with Graphic, Graflok and similar backs) and shoot as usual.

Negatives are superb in quality, with resolution in range of 150 lines per mm. Enlargements possible up to

25 times original size with virtually no grain. Positive prints meet professional standards for contrast, fine grain, long scale.

Pack after pack can be inserted and exposed without removing holder. Development takes place inside the pack, outside the holder. Positive and negative can be separated in light. Easy washing process (in room light) rinses fully-developed negative.

Both print and negative developed in 20 seconds: new versatility, new opportunity for the 4 x 5 photographer.

OUTSIDE THE DARKROOM

NIKKOREX-35

New 35mm reflex by Nikon



50mm NIKKOR f2.5 LENS OFFERS QUALITY THAT WILL ASTOUND YOU

If you want to see really sharp, big prints and color slides that sparkle with detail—shoot a roll of black-and-white or color film with the new Nikkorex-35. The new 50mm f2.5 Nikkor is an extraordinary lens—probably the sharpest, most fully corrected lens you have ever used. It can actually resolve smaller detail than the finest grain film you can buy. Try it, and see.

Here are some of the features of the new Nikkorex-35:

EXPOSURE METER COUPLED TO DIAPHRAGM AND SHUTTER with indicator needle visible both in finder, and in window on camera (ASA 10 to 1600).

50mm f2.5 NIKKOR focuses as close as 24 inches without any auxiliary lens attachment—M-X synchro shutter, speeds, 1 sec. to 1/500th, 'B' and self-timer.

AUTOMATIC STOP-DOWN DIAPHRAGM lets you focus and view with lens wide open—automatically stops lens down to 'taking' aperture for exposure.

PORRO-MIRROR REFLEX FINDER SYSTEM with convenient off-side eye-piece, Fresnel type screen and split-prism rangefinder.

SINGLE-STROKE LEVER advances film and exposure counter, resets shutter, returns mirror and reopens diaphragm.

OTHER FEATURES INCLUDE: fold-down hi-speed rewind crank, auto-reset exposure counter, accessory shoe, and hinged back.

The new Nikkorex-35 accepts a host of versatile accessories—including wide angle and telephoto conversion lenses, flash unit, close focusing attachment, filters, lens hoods and eveready case.

Arrange to see the new Nikkorex-35 at your dealer today! **\$11950**

For descriptive literature, write to Dept. MP11, Price is only



NIKON INCORPORATED • 111 FIFTH AVENUE • NEW YORK 3, N. Y.

In Canada: Anglophoto Ltd., Montreal 8, P.Q.

SALON Calendar

*13TH PITTSBURGH ALL-COLOR EXHIBIT, Pittsburgh, Pennsylvania

Closes: October 11

Exhibit: October 28-November 12

Fee: Prints, \$2; Slides, \$1.25

Sponsor: The Natural Color Camera Club of Pittsburgh

Entry Forms: T. C. Wetherby, 116 Ave. L, Pittsburgh 21, Pa.

*17TH SALT LAKE COLOR SLIDE EXHIBITION, Salt Lake City, Utah

Closes: October 14

Exhibit: November 2-3, 9

Fee: \$1.25

Sponsor: Salt Lake Photochrome Club, and Ext. Div. Univ. of Utah

Entry Forms: Glenn E. Casey, 1469 Ken Rey, Salt Lake City, Utah

*4TH NEW YORK INT. STEREO SALON, New York City, N. Y.

Closes: October 21

Exhibit: November 10

Fee: \$1.25

Sponsor: Metropolitan Stereo Club of New York

Entry Forms: Richard Jefferson, 10 E. 138 St., New York 37, N. Y.

11TH SALON OF PHOTOGRAPHIC ART, Barreiro, Portugal

Closes: November 1

Exhibit: December

Fee: \$1

Sponsor: Grupo Desportivo da Cuf

Entry Forms: 11th Salao de Arte Fotografica, Grupo Desportivo da Cuf, Barreiro, Portugal

ALLAHABAD INT. SALON OF PHOTOGRAPHY, Allahabad, India

Closes: November 25

Exhibit: January 1962

Fee: \$1 for four prints or slides

Sponsor: Photographic Society of Allahabad

Entry Forms: Hon. Secretary, 74 Yahiapur, Allahabad 3, India

*4TH HELSINKI EXHIBITION OF PHOTOGRAPHIC WORK, Helsinki, Finland

Closes: December 9

Exhibit: January 26-February 4

Fee: \$1

Sponsor: The Association of Finnish Camera Clubs

Entry Forms: Allan Gronvall, Aurorank. 15 C 28, Helsinki, Finland

*17TH CHICAGO INT. EXHIBITION OF NATURE PHOTOGRAPHY, Chicago, Ill.

Closes: January 15

Exhibit: February 4-25

Fee: \$1 for four prints or slides

Sponsor: Nature Camera Club of Chicago

Entry Forms: Frank Pfeiffer, 2347 S. Harvey Ave., Berwyn, Ill.

*Uses standard PSA practices

MODERN PHOTOGRAPHY

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KEYSTONE "HORIZON" SERIES

all-new, all-automatic, all-time camera values!



HORIZON 12 REFLEX AUTO-ZOOM with Feather-Touch Power Control. Here, in a beautifully styled, compact body, is the camera that brings the beginner every professional movie effect — automatically, with utmost simplicity.

REFLEX "THROUGH-THE-LENS" FINDER. Shows exactly what camera shoots, eliminates parallax error even while zooming.

FEATHER-TOUCH POWER CONTROL. Exclusive fingertip control power-zooms you smoothly from panoramic shots to telephoto closeups . . . and back.

FOCUSING EYEPIECE for comfortable, sharp viewing.

f1.8 FOCUSING ZOOM LENS. 9 to 27mm range. Zooms in focus. Distance focusing ring assures pinpoint focus from 6 ft. to infinity. "Universal" focus setting.

AUTOMATIC ELECTRIC EYE SYSTEM. "Sees" light changes . . . adjusts lens instantly, continuously.

MANUAL EXPOSURE CONTROL for dramatic lighting effects and "fades." Manual zoom control. Built-in "A" Filter.

PISTOL GRIP with synchronized internal trigger. Optional extra on all Horizon models. **Less than \$210.***

not illustrated:

HORIZON 10 AUTO-ZOOM with Feather-Touch Power Control. Similar to Horizon 12, with lens-coupled zoom viewfinder instead of reflex finder. **Less than \$190.***

HORIZON 8 MANUAL ZOOM. Similar to Horizon 10, with manual zoom control knob instead of power zoom control.

With f1.8 focusing lens (Horizon 8 De Luxe) . . . **Less than \$150.***

With f1.8 fixed-focus lens (Horizon 8C) . . . **Less than \$140.***

FULL-YEAR GUARANTEE registered in your name on all Keystone cameras. For free booklet, write Dept. F-69, Keystone Camera Co., Inc., Boston 24, Massachusetts.

*See your dealer for exact retail price; Slightly higher in Canada.

BEHIND THE SCENES

New concept for electronic flash may bust field wide open—The amazing Glanz monocular at a glance—A survey of other choice and sundry topics.

The portable electronic flash market may be ready for an earthshakingly new concept—a unit with no battery. Under development right now is an electronic flash unit powered by a piezo crystal. The crystals act similarly to the ceramic phonograph cartridges which generate a small current from the phonograph needle vibrations. The piezo crystal under development, however, will produce 10,000 volts when hit three times with a small hammer. Three squeezes of the trigger produces three strokes of the hammer. You then have enough of a charge for a 200-watt-second flash unit. (Compare this with today's bigger portable units, which approach a 100-watt-second capacity.)

Associate Editor Mike Matzkin, who saw the piezo crystal in action, reports that the pressure on the trigger is negligible, light enough for any child to operate easily. How long is recycling time? Depends on how fast you can pull the trigger. A leading flash-tube manufacturer is reported to be working on a special tube for the piezo. The price of the possible future flash units may be amazingly low.

Don't hold up on your purchase of present units, however. You will probably be shooting pictures with battery-powered units for at least two Christmases to come—if the thing really works, that is.

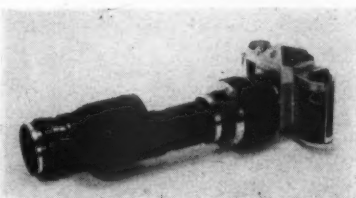
The all-purpose monocular?

Monoculars have enjoyed a big vogue among single-lens reflex owners. And whereas leaf-shutter camera owners may be limited in maximum accessory lens focal length to lenses of 135mm, a monocular of 7X gives them an equivalent focal length of 350mm. Performance is quite acceptable and the prices of the monoculars are reasonable. At present, the SLR owner can choose between a good variety of units in varying strengths—all made for (or adapted to) photographic use.

The Glanz Micro Tele Monocular may show the monocular system in its ultimate versatility. Basically, it's a 14 $\frac{1}{2}$ -oz. 7X 35 monocular with focusing mount on the objective end. Turn



You start with a 7X 35 monocular that will fit almost any SLR . . .

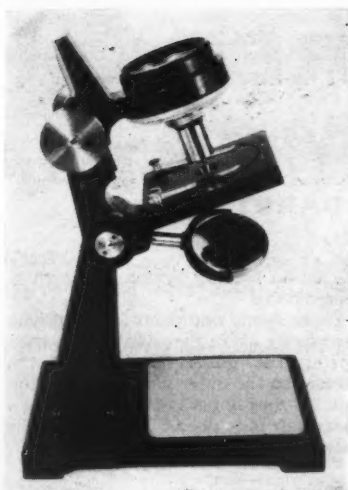


. . . and you can add a special zoom adapter that will fit almost any focal-plane shutter SLR. . . .

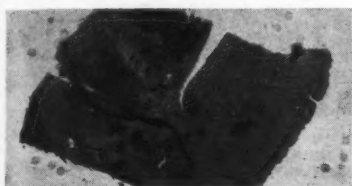
SETTING NEW STANDARDS OF EXCELLENCE AND VALUE THROUGH CREATIVE ENGINEERING



all new... at



... With monocular and adapter on this microscope stand you can take ...



... a 400X shot of a fly's eye.

the eyepiece clockwise and a threaded adapter mount extends. Adapter rings for various SLR's are available. There's also a unique zoom adapter which can be used only on focal-plane-shutter reflexes with interchangeable lenses. The zoom adapter allows you to reach a final focal length of 1000mm at $f/30$. This may seem like a rather small aperture, but check the size of a regular tele lens of this length. And check the price too.

For macrophotography and photomicrography a special micro stand is available. Besides extreme close-ups approaching 1:1 image size, magnifications of 400X are possible with this rig when you use a special close-up lens. However, the makers have roused some purists to heights of indignation with claims of 1200X. Seems they took a 400X picture, enlarged the negative 3X and cropped the print.

In any event, if and when this unit and accessories hits the U. S. markets, expect the monocular to sell for about \$40 with the zoom adapter and microscope stand costing just about the same amount each.

Zooms are on way

Despite the views of many optical experts that the day of the practical, adequately sharp, moderately priced zoom lens for 35mm single-lens reflexes is not yet at hand, expect a flood of tries within 6 months. Various

German and Japanese factories are hard at work on preproduction samples. There are two divergent views as to what focal-length range is most practical.

One group insists on 35 to about 85 or 100mm. The other feels that camera owners won't want a zoom lens in which at least one point (50mm) duplicates the focal length of the original camera lens. They point to two additional disadvantages. The call for wide-angle lenses, they claim, is slowly dying while the demand for longer tele lenses is increasing. In addition, there's some doubt as to whether owners of SLR's will be satisfied with preset diaphragms in this range. Since each zoom lens will be designed to fit a number of different SLR's, incorporating varying auto diaphragms to accommodate each separate camera's auto diaphragm system is out of the question technically and financially.

From 85 to 200mm or so, the alternate range, preset lenses rather than automatics have been the standard anyhow. In addition, the long zoom would answer increased consumer demand for long lenses.

Most zoom lenses will be made with a single barrel but will be adaptable to any SLR's with a series of interchangeable threaded adapters. Designers are trying to hold the list prices down to under \$200.

(Continued on page 45)



... all automatic...all-time value!

KEYSTONE "106" AUTO-THREAD ZOOM PROJECTOR with Projecta-Viewer

PROJECTA-VIEWER. Exclusive power editor. Single-knob control channels film at reduced wattage onto big bright editing screen. Notcher marks unwanted frames. Viewer swings aside for full-screen projection. Edit, splice with Mylar tape splicer.

ULTRA-FAST 11.2 ZOOM LENS. Zooms picture to fit screen from 11 to 20 feet away. Zooms in focus for dramatic close-ups.

AUTO-THREADING. Threads film automatically in 6 seconds.

ULTRA-BRIGHT SUPER TRU-FLECTOR LAMP. Brighter, cooler than 750 watts. Low voltage.

SELECTROMATIC CONTROL. One knob controls forward, reverse, still, stop, fast rewind. Speed control.

HANDSOME, LOW-SILHOUETTE STYLING. Compact, durable die-cast aluminum body and cover. Fully geared reel arms.

OTHER FEATURES: 400-ft. reel (32 minute show) • Swing-out film gate • Precision focusing knob • Room light socket • Tilt control • Lifetime lubrication.

Less than \$160.

See your dealer for exact retail price.

FULL-YEAR GUARANTEE registered in your name. For free booklet write Dept. F-66, KEYSTONE CAMERA CO., INC., Boston 24, Mass.

IN FIRST PLACE!



GOSSSEN® *Lunasix* ELECTRONIC MOST SENSITIVE WIDEST RANGE EXPOSURE METER EVER MADE!

Introduced a few short months ago, the Gossen LUNASIX Electronic has been acclaimed around the world! No other exposure meter so effectively measures the extremes of light—from faintest moonlight to blinding sunlight! Try the Gossen LUNASIX Electronic yourself—for an adventure into new photographic horizons!

HERE'S WHY THE LUNASIX HAS WON PRAISES FROM STILL AND MOVIE PHOTOGRAPHERS EVERYWHERE!
Measures reflected and incident light with (built-in hemispheric diffuser) • 30° light acceptance angle • Two-button brightness range system • Automatic needle lock • Built-in battery tester • External zero adjustment • Smooth one-hand operation • Computer range: ASA 6/1" to 12,000/12"; 1/1 to 1/90; 1/4,000th sec. to 8 hours; Cine: 8 to 128 frames per sec.; EV -9 to EV +22; .014 to 14,000 foot-candles • Weight 7 ounces.

Another famous GOSSSEN meter

GOSSSEN® *Sixticolor* color temperature meter and filter indicator



INSTANTLY Shows color temperature of light source (in degrees Kelvin). Filter required for correct color balance... with ANY type of color film. Calibrated in "decamired" filter scale adapted by leading camera and filter manufacturers. Complete with leather ever-ready case and gold-metal chain.

See the entire Gossen line at better camera stores.

KLING PHOTO CORPORATION
257 PARK AVENUE SOUTH, NEW YORK 10, N. Y.

PICTURES in a ~~MOMENT~~

by JOHN WOLBARST

With 10-second development, film goes fast. Here's a quicker and easier way to reload your camera.



Reloading any camera becomes a real chore if you don't have a table or other convenient place on which to rest it. And with the standard method of loading film into a Polaroid Land

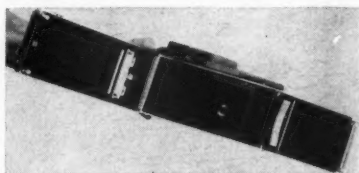
camera it's even more of a problem, since you have to close the front of the camera before you can lay it down on anything, if some support is available.

Quite awhile ago I worked out a system for reloading my camera which eliminates most of the nuisance. Now, with 10-second film I find I can work very rapidly, if necessary, and if my supplies of film and money hold out.

Ordinarily, it's possible to set the opened camera down for a moment in order to tear open the package of film. However, if that's not desirable or possible, I find it fairly easy to hold the camera by the strap with three fingers, while tearing open the film package with thumb and forefinger. Now, on to

the actual loading, which is shown in these photos.

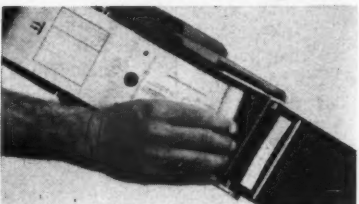
There's only one point at which you need to be extra careful. That's when closing the outer back. Hold the camera so the outer back doesn't slam shut on your fingers—it can give you a nasty nip if it does. Instead, let the back close slowly.



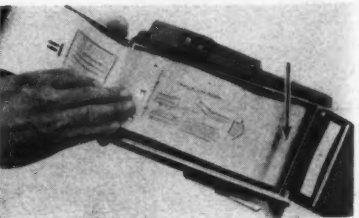
3. Unlatch back, open outer and inner backs, hold camera so film chambers are up and fairly level.



4. Take unwrapped film in right hand, flip leader open, insert larger (positive) roll into larger chamber.



5. Carry smaller (negative) roll across camera, unwinding paper leader, to smaller film chamber; insert roll.

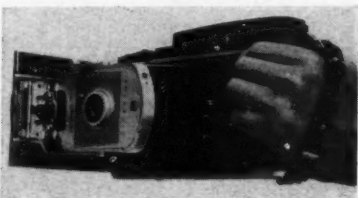


6. Smooth out leader so it lies flat across back of camera. Don't break seal on negative roll (arrow).

(Continued on page 60)



1. If there's no place to set your camera down, hang it from three fingers while opening film package.

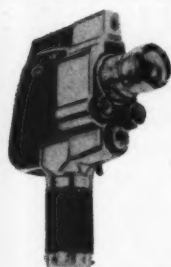


2. Now for loading. Grasp camera firmly in left hand, as shown. Hand must go under carrying strap.

NEW products

Information and specifications for the products here described are supplied by the manufacturer, and do not constitute tests by MODERN PHOTOGRAPHY.

Electric Eye on Carena Zoomex



The Carena Zoomex 8mm automatic electric zoom camera has a $7\frac{1}{2}$ to 35mm f/1.8 Angenieux lens, which focuses down to 2 ft. Viewing and focusing are through the lens. The camera has five operating speeds of 1, 8, 16 and 32 frames per second, plus single frame. Film runs 8 ft. on one winding. The built-

in electric-eye exposure meter has an ASA scale 10 to 400. Other features: insufficient light indicator in the viewfinder; cable release socket; tripod socket; safety lock to prevent accidental shooting; hand grip which turns to wind the motor; warning chime which rings 3 sec. before the spring runs out; automatic resetting footage counter. The Carena Zoomex costs \$309.50. Write:

EXAKTA CAMERA COMPANY
705 BRONX RIVER ROAD, BRONXVILLE, N. Y.

DeJur "Push-Button" Dyna-Zoom



The DeJur "Push-Button" Dyna-Zoom 8mm electric eye movie camera, with Bausch & Lomb $9\frac{1}{2}$ mm to 29mm f/1.9 zoom lens, focuses as close as 5 ft. and has a universal focus setting.

The vari-zoom lens is operated by push buttons for automatic zooming but includes an adjustment for manual zooming. E.I. range on the exposure meter is from 10 to 40. A stainless steel lid covers the photocell when not in use. Other features: continuous run and single-frame operation; back light compensation control; built-in color conversion filter; and sprocketless loading. The DeJur "Push-Button" Dyna-Zoom sells for \$199.95. Write: DEJUR-AMSCO CORPORATION
45-01 NORTHERN BLVD.
LONG ISLAND CITY 1, N. Y.

Another Polaroid Electric Eye



The J33 is a pocket-sized camera ($7\frac{1}{2}$ x $4\frac{1}{2}$ x 3-in. when closed) which produces wallet-sized pictures ($2\frac{1}{4}$ x $3\frac{1}{2}$) with 10-second 3000-speed film.

Push the four successively numbered

(Continued on page 20)

NOVEMBER, 1961

Why are there 19 electrical resistors in the new fully automatic electric eye **FUJICA** 35EE

Shown here, enlarged twice actual size, is one of the reasons for the consistently correct exposures you get AUTOMATICALLY with the New FUJICA. Instead of having gears or cams that might be affected by temperature or physical shock, there are 19 electrical resistors. These control the infinitely small electrical impulses generated by light that hits the electric eye. They are part of an unusually precise system that opens up or closes down the lens AUTOMATICALLY.

In addition, the tremendous light gathering power of the world-famous FUJINON 6 element f/1.9 lens gives you perfectly exposed shots at light levels so low, other cameras require flash. A "Close-up Light-Lock" enables you to expose properly for a specific part of your subject, no matter how bright or dull the side or background light.

The fastest action poses no problem. You have 11 shutter speeds from one full second up to 1/1000th, all automatically coupled to the electronic light meter. A built-in Stop and Go Signal tells you when to switch to a slower shutter speed for a particular light situation.

Overall operation is quite simple. FUJICA's natural thumb position rear focusing enables you to shift and pinpoint your focus quickly and smoothly from closeup to middle shot to infinity without finger fumbling. An extra large viewfinder window "previews" your picture in the exact size you want without confusing crop lines.

FUJICA's price?

Surprisingly low! . . . With FUJINON 6 element f/1.9 lens and speeds up to 1/1000th.

Less than \$120

Visit your camera store for FUJICA's 5-minute demonstration or write for FREE booklet today.



FUJI PHOTO OPTICAL PRODUCTS INC., 111 Fifth Ave., Dept. A-58, New York 3, N.Y.
In Canada: FUJI Precision Cameras of Canada Ltd., 5385 Pare Street, Montreal 9, P.Q.

BIGGEST SELLER IN 35mm SINGLE LENS REFLEX CAMERAS!

all new EXA II

THE ANSWER TO MILLIONS WHO
WANT TO OWN A PRECISION
SINGLE LENS REFLEX CAMERA



Created by the makers of the world-famous Exakta, the Exa II is setting new sales records! People who want an Exakta, but cannot afford to pay for one, are glad to become proud owners of an Exa II because it embodies most of the advantages of the celebrated Exakta. Every Exakta owner will find the Exa II to be a welcome fulfillment of his wish for a second camera for himself, or as a gift for his family or favorite friend. The Exa II takes all Exakta lenses of high resolving power from a 24mm wide angle to a 1000mm telephoto!

The new Exa II focal plane shutter offers a high range of 9 speeds, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, and Bulb. Most lenses for the Exa II have automatic lens diaphragms. There are many, many features in the Exa II as: one-stroke lever wind, built-in MX flash synchronization, built-in eye-level prism viewfinder, automatic film counter, film-load indicator, auto film counter, hinged back and more—yet the Exa II is modestly priced for everyone to buy and enjoy.

List	
Exa II with eye-level prism viewfinder and f/3.5 Zeiss Tessar (preset)	\$ 79.50
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Exa II, camera body only with eye-level prism viewfinder, no lens	69.50
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Leather Eveready case for Exa II	9.95

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NEW PRODUCTS

(Continued from page 19)

buttons, as outlined on the back of the camera, and you have your picture. The electric eye, controlled by a selenium cell exposure meter, has shutter speeds ranging from 1/15 sec. to 1/1000 sec. While the normal aperture is f/32, a lighten-darken control can be used to adjust the aperture. A low light level indicator signals when the AG-1 flashgun, built into the front of the camera, is required. Current for firing flash is provided by constant voltage alkaline cell, either Eveready No. E91 or Mallory No. Ma 1500, each said to last approximately 2 years. Provision has been made for the camera to accept a slower color film when it becomes available. The Polaroid Electric Eye Model J33 sells for less than \$75.00. Write: POLAROID CORPORATION, CAMBRIDGE 39, MASSACHUSETTS

16mm B & H Sound Projector



Bell & Howell's Model 535 Filmosound 16mm motion picture projector, with 2-in. f/1.6 Super Proval lens, uses a 1000-watt Proximity lamp with built-in reflector in a swing-out housing. Either 750- or 1200-watt lamps may also be used. All controls are on a vertical panel which is illuminated during projection. A single knob controls the on-off, forward, reverse and rewind operations, and another, double knob controls sound volume and tone. Other features of the projector, which weighs 29 pounds, are: screw-on zoom lens attachment; swing-out gear-driven reel arms; adjustable three-tooth shuttle; room lamp cut-off when projector is running; sealed lubrication; 10° elevation; and 400-ft. reel capacity. Model 535 Filmosound projector is priced at under \$600. Write: BELL & HOWELL

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Small Monojet Flash Unit



The rectangular Ultrablitz Monojet SP electronic flash unit weighs 16 oz. and measures 4 1/4 x 3 3/8 x 1 1/8 in. It is equipped with a sealed-in nickel-cadmium battery (rechargeable on 110-220 volt AC) and has monitored transistor circuits. Other features: 40-watt-sec. output; 65° angle of coverage; 5600K color temperature; 1/1300-sec. flash duration; audible and visual ready signal; built-in sync. cord; and dual mounting shoe. The manufacturer recommends a guide number of 32 for Kodachrome. Recycling time is 10 sec., with about 70 flashes per charge. The Ultrablitz Monojet SP, with battery recharger, is priced at \$74.95. Write: ALLIED IMPEX CORP., 300 PARK AVE. S., NEW YORK 10, N. Y.

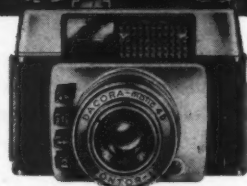
Rollakit for Film Processing

Cormac's Rollakit permits black-and-white film processing in roomlight in about 15 min. The Rollabath single-solution developer and fixer, one component of the kit, is an improved version of Cormac's Unibath CC-1. Also part of the kit are a film loading compartment, special processing tank, and two film clips. For instant film drying, Rolladri will be available. Rollakit sells for \$12.95. Write: U.S. PHOTO SUPPLY

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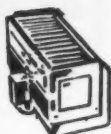
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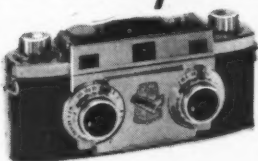
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Home color processing kit promises
a new easy way of color printing.
But how easy is it?



Since the advent of color, manufacturers have been offering "do-it-yourself" kits supposedly suitable for the average amateur to use in bathroom, kitchen or other home darkroom

setup. Such processes as Ansco Printon and Kodak Ektacolor Print Paper do produce acceptable results, though they involve lengthy processing and relatively complex filtration.

The FR Corp. and Agfa Inc. each promise a new color processing kit that will greatly simplify home color printing. The glowing descriptions in their news releases indicate a color printing technique almost as easy as black-and-white. This column is devoted to the FR Color Kit. The Agfa-color Kit will be discussed later.

The FR Color Kit, it's promised, will sell for \$12.95 and contain 20 sheets of 3 1/2 x 5-in. paper; red, green and blue additive exposure filters; an exposure calculator; an infrared filter for use with Kodacolor negatives; color developer; color fixer; a safelight filter and instructions. (Except for the exposure calculator, this kit resembles the British Pakolor Kit.)

Since the FR kit is not yet in production, we were given a sample which contained custom-mixed chemicals and a hand-made calculator. The manufacturer assured us that the packaged kit will be similar to this sample.

Supplied with the kit is a small square sheet of translucent acetate diffusion material which is placed in a filter holder attached to the lens. (The holder will also be supplied as part of the kit.) This serves to scramble the colors in the negative during the test so that no image is recorded on the paper, and an overall exposure and color balance can be approximated. The exposure calculator used in making the test has numbers from 1 to 48 representing exposure times. Alongside the column of figures are three series of small gray rectangular blocks graduated in tonal density. Each series is covered with a red, blue or green piece of gelatin.

To make a test print, place the Kodacolor negative in the negative carrier

of the enlarger, insert the infrared filter in the holder below the lens and with the lens wide open focus the image on the easel to fill the 3 1/2 x 5-in. print size. Turn the lights out and place the exposure calculator on the easel over a piece of paper 2 x 2 1/4-in. Expose for 30 sec. under the olive green safelight. Place the exposed test strip in paper developer for 5 min. at 70F, rocking the tray now and then. Rinse for 30 sec. and fix for 1 min. The lights can now be turned on.

Here's how the test strip tells you the approximate exposure times. Remember that the scrambled colors of your negative passed through a red, green and blue filter covering the graduated gray blocks of the exposure calculator. Thus, the colors on the test strip will also be graduated, ranging from very pale to dense tones. The number opposite the first fully formed block in each column tells you the amount of exposure time necessary through each filter.

Lights on sooner than ever

Before making your first print, remove the acetate diffuser from the enlarger. Expose the negative three times, once with each of the red, blue and green filters, for the length of time indicated on the test strip. After exposure, place the paper in the color developer for 5 min. at 70F, rinse in water for 1 min., fix for 3 min., wash for 5 min., place in the bleach for 10 min., and give a final 15-min. wash. Lights can be turned on after the paper is in the fixer for 1 min. You can't see the final color at this stage, but with experience you can tell how far you're off in exposure and color balance. Color can be judged generally after 3 min. in the bleach. You'll almost certainly have to make a second and perhaps a third print. So for final correction in color balance and print density, consult the table supplied with the kit.

I made test prints for MODERN using a Leitz Focomat enlarger equipped with a 150-watt 212 enlarger lamp. Exposure through the red, green and blue filters for an average Kodacolor negative ran 60, 40 and 120 sec. respectively with the lens wide open at f/4.5—a total of almost 4 min. for a print only 3 1/2 x 5. If larger papers should become available, exposure times for such sizes as 8 x 10 and 11 x 14 using the 3-filter additive method would be impractically long.

For consistent results, you must maintain the developer temperature at 68F to 75F. However, my tests

(Continued on page 43)



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TECHNIQUES TOMORROW

by **BENNETT SHERMAN**

The orbiting astronomical observatory—an achievement in developing cameras for use in space.



In some recent columns I've been reviewing photographic progress in space. Now I'd like to tell you about two ambitious plans to study the stars and nebulae of space from satellites. The first is the Orbiting Astronomical Observatory, known by its initials "OAO."

The astronomical activities of this

project are supervised by the Smithsonian Astrophysical Observatory, in association with Harvard University. The Smithsonian is most famous for its work in tracking and computing the orbits of man-made satellites. Its scientists decided that the best use of the observatory can be made by restricting it to the far ultraviolet. The near UV, the visible, and some of the near-infrared parts of the spectrum can be seen from the ground. The far UV can give us new information about the stars.

Now then, how are the astronomers going to get back the orbiting observatory data? Photographs would have to be recovered, meaning a complex rocket system for return to the surface of the Earth. The Discoverer rocket program is experimenting with

this very difficult process. The OAO may not be able to contain such a complex system as this. Instead, the Smithsonian scientists have selected the remote TV method that was outstandingly successful with Tiros.

Let's look at the optics chosen for the telescopes in the OAO. In order to insure adequate collection of the UV light from the stars, an all-mirror telescope design was selected. A moderately wide-angle telescope free from all of the common aberrations, consisting of only two mirrors, was first developed over 50 years ago by Schwarzschild, one of the most famous European optical physicists of his day. This telescope uses concave mirrors, arranged in a way needed to reduce the aberrations to desired values. In order to give good reflectivity in the far UV, these mirrors will be coated by a special process.

The "picture" takers will be the most difficult and amazing part of the telescope "camera." These are UV-sensitive television tubes developed by Westinghouse. They possess the ability to store up the picture information somewhat in the same way that the photographic film can store up the picture by a long exposure. When the satellite is over one of several ground stations to be constructed for the purpose, the TV camera will transmit the stored picture to the ground. Special electronic techniques are being con-

This is full-time exposure control



1.

You know exposure's correct for the picture because the meter needle is centered in the brackets in the viewfinder of your Kodak Retina Reflex III Camera.



2.

But as you move to another viewpoint and the lighting of your subject changes, the needle swings off center, you see you need a quick exposure adjustment...



3.

You make it instantly. You recenter the needle without taking the camera from your eye—without losing your framing. And it takes but a split second.

sidered by the Smithsonian scientists for getting the picture back clearly. On the ground the picture may be videotape-recorded, or displayed on a TV set and photographed for permanent record. Four telescopes with a main-mirror diameter of around 12 in. are planned.

Another, more ambitious astronomical satellite has been suggested by Dr. Aden B. Meinel of the Kitt Peak National Observatory near Tucson, Arizona. He studied the shape of the nose-cones of large rockets and decided that a 60-in.-diameter mirror telescope could be designed to fit into the allowed space. He envisages a fast Cassegrain-type telescope—that is, a reflecting telescope in which the primary mirror is concave, as it normally is, but the secondary mirror is convex instead of flat, thus giving greater magnification. The "picture" taker would again be a TV camera.

Holding the "camera" steady

One of the most serious and difficult problems in both of these satellite-observatory projects is the stabilization and aiming of the telescope. One of the best methods being considered is the gyroscopic or inertial-guidance platform. The advantage of this kind of control is that it establishes a fixed reference in space without connection with the Earth. This means that the telescope can be pointed and the aim

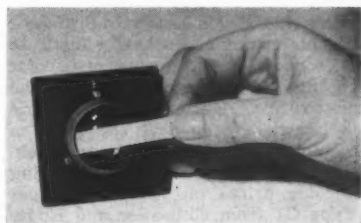
maintained accurately for relatively long periods of time without complicated ground control. Any extra control equipment which can be eliminated means that the experimental part of the satellite can be enlarged.

Photographic film is recognized as one of the best means of recording data about the universe around us. It is, however, just a gelatinous mixture of chemicals, and when it is taken out into space many unpleasant things happen to it. High-energy atomic particles cause exposed streaks; the cold of space causes changes which affect the gelatin and the chemicals; finally, in a vacuum, the moisture in the emulsion boils out and causes bubbles.

Still, because photographic film is so useful, it is being studied very carefully for space applications. Experiments are being conducted in methods of protecting the film against the atomic particles and the cold and vacuum of space. Special surface coatings, and specially designed capsules, are being tried to permit using and retrieving the film from space. Photographic film may yet become one of the main ways to get pictures in space and bring them back for study and analysis. As our rocket engineers produce launching vehicles of greater payload capabilities, larger and more complex photographic equipment will be used in tomorrow's space- and Earth-study programs.—THE END

DO IT, DO IT, DO

GET SHARP ENLARGEMENTS. Here's a handy method of getting precise focus with your enlarger. Measure the diameter of the enlarging lens, then cut a piece of masking or adhesive tape a little longer than one-third this distance. Place the tape over the center portion



of the lens mount. With the lens wide open, project the negative on the easel. If it's out of focus, you'll see a double image. Adjust the enlarger, and when the two images are brought together, the negative will be in focus. Remove the tape from the lens mount and make the exposure. (If you own a twin-lens reflex camera, you can achieve the same split-image focusing effect on the ground glass by placing the tape over the viewing lens mount. Here, the tape can be left in place.)

The Kodak Retina Reflex III takes you as close to perfect pictures as a camera can

Right down to the last split second before you trigger the shutter, the needle in the viewfinder of this new Kodak Retina Reflex III Camera tells you whether exposure's right or wrong.

This "checkup" needle is centered when exposure's right. If it flicks off center because the light changes, you can recenter it for perfect exposure without taking your eye from the viewfinder. Here's how it works:

The viewfinder meter needle operates in tandem with the precision automatic electric-eye meter needle in the camera top. Center the up-top needle, and your aperture's correct for the shutter speed you've selected (10 in. all, up to 1/500).

Exposure's automatically right—and it stays right even if you switch shutter speeds. For aperture and shutter controls are coupled.

With the camera at your eye, a glance at the needle in the viewfinder

tells you if exposure is still correct. If the needle is off center, you can recenter it without lowering the camera—without losing critical framing.

Through the viewfinder of the Kodak Retina Reflex III you see what the lens sees. Never a worry about parallax! You view on full-area ground glass. So, as you focus, the entire picture becomes sharp—not just a central fragment. A split-image rangefinder in the center of the ground glass lets you focus on critical details, even in dim light.

Automatic pointers show you depth of field at every f/stop. Shutter release on the front of the camera gives you a rock-steady grip. A new, larger viewfinder eyepiece means more convenient viewing, even if you wear glasses.

With f/1.9 lens, less than \$250. With f/2.8 lens, less than \$215. A complete system of photo aids, including wide-angle and telephoto interchangeable lenses, is available to

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New Photo Books

MAKE YOUR OWN COLOR PRINTS, by Robert Bagby, 168 pages, numerous illustrations. McGraw-Hill Book Co., Inc., \$4.50*

Robert Bagby is Associate Professor of Photography at Rochester Institute of Technology. His professional color shooting experience dates back to the early 1930's. He uses his vast store of knowledge to put together a thorough yet very easy-to-read book.

The main emphasis is on the making of color prints on Ektacolor paper (Type C) from Ektacolor and Kodacolor negatives. Also included are chapters on producing color transparencies from color negatives on Ektacolor Print Film, and the making of color prints from transparencies using Anscochrome Printon.

Logically enough, Mr. Bagby starts with a general discussion of color photography and the materials available on both domestic and foreign markets. This is followed by chapters on shooting and processing Kodacolor and Ektacolor negatives. Once having

grounded you in how to get a really printable negative, he introduces you to the use of Ektacolor paper. Full explanations cover exposure, filtration, dodging and printing-in, processing, drying, retouching, mounting and finishing. Special techniques, such as creative and composite printing, as well as the making of quality black-and-white prints from color negatives, are treated in a separate chapter. A valuable table is the one on p. 166, which gives processing times for Ektacolor paper in a range of temperatures from 73 to 87 degrees. For those of us who don't have adequate temperature controls, this table will be found extremely useful. Numerous black-and-white illustrations show how to handle the materials and equipment used in color printing.

My only carp is that the book contains only two, rather dull, pictorial color illustrations. These are poorly reproduced. It would have been nice to have included instead a number of how-to shots in color. The high cost of

color reproduction probably precluded this, however. Despite this last shortcoming, *Making Your Own Color Prints* is easily worth the \$4.50 asked for it.

—NORMAN ROTHSCHILD

HAND COLOR YOUR PHOTOGRAPHS WITH OILS AND DYES, by Kitty West, 124 pages. Chilton Company, \$1.95

This undoubtedly is the finest text on the hand coloring of photographs available—clear, well-written, nicely organized. Sources of materials are analyzed and various techniques are explained fully. The cost of including color plates has cut the full color illustrations to four pages and these can hardly be called useful. How can you teach hand coloring without sufficient step-by-step color illustrations?—H.K.

PHOTO MAXIMA IV, Variety and Vision in Photography, founder-director Hope Saunders, 80 pages. Arco Publishing Co., Inc., \$5.95*

The total effect of this year's annual—dull lifeless pictorials, coupled with humdrum snapshots—is all one could possibly expect given the ingredients used. Only photographs from those photographers paying a \$3 entrance fee were considered. (Far from requiring a fee, most annuals welcome all entrants and pay for each picture printed even if the payment is only a small token.) The printing of the

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photographs is quite poor. The inclusion of Alexander King as one of the three judges is in questionable taste. It has been many years since King has given serious thought to serious photography.

The caption accompanying the pictures of the judging itself, however, does bear partial quoting:

"Today this house was full of tigers. The concentration of dynamic personalities was so great that one could practically feel their pulse in the walls. . . . The mood of this meeting changed momentarily from hysterical laughter to sober silence to active enlightening discussion and so on."

We can understand the sober silence. Feeling anyone's pulse in the walls is apt to bring it on.—H.K.

THE JAPANESE FILM: ART AND INDUSTRY, by Joseph L. Anderson & Donald Richie, with a foreword by Akira Kurosawa, 456 pages, illustrated. Charles E. Tuttle Co., \$7.50*

The Japanese movie industry produces 500 films a year, three times as many as Hollywood. Not surprisingly, a large number of these 500 are at best routine, churned out to schedules whose demands would frighten the most hard-bitten Grade B director. But there are still many more good Japanese movies than the number we see over here would suggest. According to Messrs. Anderson and Richie, it's

the Japanese themselves who refuse to release their films, largely in the belief that foreigners cannot appreciate anything truly Japanese.

This is one of the many startling features of the Japanese film world that help to make the book as entertaining as it is instructive. The first section presents a detailed history of the Japanese cinema, and right on the third page we're introduced to the *benshi* or narrator, a carryover from the classical theater who affected the whole development of the Japanese silent film. Moving up to the present, in the section that describes the techniques of Japanese film making, we learn that the cinematographer, unlike his counterpart in the West, also operates the camera, and would not dream of letting an assistant do so.

In the historical section, which occupies about two-thirds of the book, the authors do at times bog down in the task of describing so many films, but the wonder is that they manage to sustain our interest in a subject where they can assume no knowledge at all on the reader's part. They become even more readable in the second section, which covers the content of Japanese films; technique, including production methods; directors; actors; theaters and audiences.

Messrs. Anderson and Richie, who have both lived in Japan, know and love their subject. Anyone who reads

this book will probably share their love as well as their knowledge. They will certainly have made an enjoyable excursion through a world where top directors have more power than any producer, and the rest may have less power than any others in the world; where audiences take their films with tremendous seriousness; where featured players may appear in as many as 30 movies a year, thus earning as much as a star; and where even the film titles have an exotic allure, from *The Men Who Tread on the Tiger's Tail* to *Uproar over the Aphrodisiac Dumpling*.—W.H.J.

FAMOUS PORTRAITS of famous people by famous photographers, edited by L. Fritz Gruber, 159 pages. Ziff-Davis Publishing Co., \$10

Certainly this is one of the most carefully edited, well chosen and catholic compilations of portraits ever gathered between covers. Photographers range from Adam-Salomon, born in 1818, to Bert Stern, just past his thirtieth birthday. There are 120 portraits in all, well reproduced on good-sized pages. Few if any portrait giants are left out and many fine European artists not generally known here are represented. Here is Arnold Genthe's Isadora Duncan swathed in mystical, romantic, infuriating fuzziness directly across the page from Karsh's almost
(Continued on page 44)

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MOVIE VIEWER

WILLIAM JOHNSON

An interview with J. Lee Thompson, director of "Tiger Bay" and "The Guns of Navarone."



"I'm delighted whenever I can cut a line of dialogue." This was said to me by a director who, surprisingly, entered motion pictures by way of the theater and began his movie career as a writer and dialogue director. But J. Lee Thompson has long since learned that movies must generally move, and the crackling pace of *The Guns of Navarone* (written and produced by Carl Foreman) depended largely on his willingness to eliminate scenes or parts of scenes that seemed fine in themselves.

"The first cut of *The Guns* ran for 3 hours, 10 minutes," he said. "This looked pretty good, but we felt it was too long for what was meant to be a rapid-action movie. So we reduced it by 35 minutes, bringing the final cut—the one you see in the theaters—down to 2 hours, 35 minutes. We did this partly by trimming the beginnings and endings of scenes—for example, just by cutting out an average of five seconds from every minute, we could get rid of a total of over 15 minutes. And partly, of course, we had to cut out whole scenes from the movie. Stanley Baker (who plays Brown, the bearded soldier with the knife) suffered the most from this: he's still in a lot of scenes, but has far less to do or say. I think it's a pity, but something just had to go.

"Of course, it's always possible to cut out too much. That's what attracts me about the suspense-thriller movie: it's a constant challenge. You have to hit the right balance between letting

the action go slack and overdoing the crises." Thompson then described one minor choice between too little and too much suspense in the scene in *The Guns* where the detonator of an explosive charge has been fastened to the elevator well in the German gun emplacement. When the Germans first descend, the elevator doesn't quite reach the detonator—as is shown in a close-up. "I wanted to include four elevator descents before the explosion," said Thompson, "but Carl Foreman insisted that three would be enough. He was probably right."

As far as American audiences are concerned, *The Guns of Navarone* reinforces a reputation that Thompson first established in last year's *Tiger Bay*. But English-born Thompson has been directing movies since 1951, when he asked to direct his adaptation of his own play, *Murder Without Crime*.

"Did this first experience give you any particular difficulties?" I asked.

"Oh no. For one thing, I'd done some stage directing; and as for the technical side, don't forget that I'd been working in movies on and off for 15 years. I'd been through all the departments—watched directors and photographers on the set, worked in the cutting room, and so on."

"As a director, do you concern yourself with photographic technique?"

"Yes indeed! For example, the photographer may be going to use a 50mm

To solve 12 problems:



lens for a scene and I ask for a 75, because I want the leading lady in a nice close-up. Of course, I always listen to what the photographer says—after all, he knows more about the job than I do. But the director must know what the camera can do and what the results will look like on the film."

"Do you know any preference between color and black-and-white?"

"No: it all depends on the movie, *Tiger Bay*, with its settings in the gray Cardiff dockland streets, was a natural choice for black-and-white. *The Guns*, with its high adventure in fairly exotic settings, was an equally natural choice for color. But there's an added hazard with color: the photographer can break his back trying to get good quality, with proper matching from scene to scene, only to see it all ruined in the prints. We were horrified when we saw the first prints of *The Guns*—I knew the care Ozzie Morris had taken."

"*The Guns* is in CinemaScope: do you like this format (2.66:1 ratio)?"

"Frankly, no. I worked with it before, you know, on *Flame Over India*, but there's just too much space to fill. I prefer the normal format (1.66:1)."

"Do you concern yourself with other technical details besides photography—editing, for example?"

"Yes, I do. I always try to plan the editing in advance and shoot with it in mind. I know of one director who shoots off the cuff, choosing camera

angles, etc. for each scene as he comes to it, but I couldn't do that. It's too risky, for one thing: you could find yourself with two successive scenes that just can't be matched together. And of course, even though this particular director is used to working that way, he ends up shooting about three times as much footage as anyone else.

"After the shooting is finished, I indicate where I'd like the cuts to go—even at what word in a line of dialogue the image should cut to a different angle—and then I discuss every cut with the editor. But since I spent only six months in the cutting room, the editor's suggestions are often better than what I planned."

The sound needs direction too

"I've noticed some interesting uses of sound in your movies, Mr. Thompson. In *Tiger Bay*, for example, there's the quarrel scene between the Polish sailor and his woman, with the little girl spying on them. Their dialogue is in Polish when the camera is showing them from the little girl's point of view, but cuts to English for the close-ups. I found that this device successfully created the impression that I understood Polish!"

"I'm glad you liked it—I wasn't sure how it would come off. Yes, as far as sound is concerned I always try to supervise the dubbing of the track."

"How about the stereophonic sound

in *The Guns*? Here again, I was particularly struck by its use in the scene where a German spotting plane is searching for Gregory Peck and his team: you don't see the plane, but you hear it circling right overhead."

"Well, there's a story behind the stereophonic sound in *The Guns*. We'd originally planned to use quite a lot of it, but we had to finish the track in a hurry for the Royal Command Performance in London, and we only had time for a few stereophonic scenes. We smiled to ourselves when the critics praised us for its restrained use! By the way, we deliberately made the sound track of *The Guns* very loud—but here we're at the mercy of the projectionists. They're supposed to follow the sound charts that are sent out with every movie, but some of them don't bother; or else someone in the audience complains about the noise and they turn it down. I saw *The Guns* at one theater where the sound was turned down and it quite spoiled the effect."

"A lot of scenes in both *Tiger Bay* and *The Guns* were shot on location. Do you find any particular problems in location shooting?"

"I certainly do. There are technical problems, for a start: by the time everything's set up for shooting a scene and you've finished rehearsing it, the photographer tells you that the

(Continued on page 30)

open 1 box of Kodak Polycontrast Paper

Here are 12 negatives—some flat, some contrasty, some average. To get fine prints from all 12, you'd need many boxes of regular paper . . . but only one box of Kodak Polycontrast Paper.

You could print negatives 1, 2, 3, and 4, which are of average contrast, on Kodak Polycontrast Paper just as it comes from the box. No filter needed.

For those contrasty, soot-and-white-wash 5th, 7th and 11th negatives, slip a No. 1 Kodak Polycontrast Filter in your enlarger. The print you make will be rich, full-scale, as if you had used a "soft" No. 1 paper.

Negatives 6 and 10 are soft and flat. The No. 4 Kodak Polycontrast Filter will let you print rich blacks and sparkling whites even though the negative promises very little.

Number 8 negative is almost normal, but just a little contrasty. Using regular grade 2 paper could leave you with blocked up whites. Grade 1 might be a trifle too soft.

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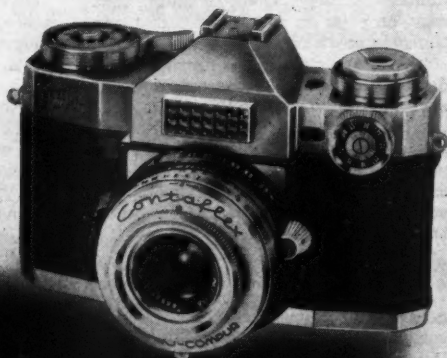
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MOVIE VIEWER

(Continued from page 29)

sun has moved round and would you mind doing it over here instead! And then, of course, it's almost impossible for actors to do an intimate scene well amid all the crowds and distractions of location shooting. No, I prefer working in the studio, where everything's under control."

"Do you find any special problems in directing the actors?"

"There's a fairly common idea that screen actors don't know or think about what they're doing; that they just stand there dreaming of orange pudding or something like that. It isn't true. What is true is that the screen actor knows he can often achieve a better effect by keeping his body and his features still than by trying to show a reaction. On the other hand, stage actors tend to force their reactions, and I have to bring them down. The most effective way of doing this is to show them the rushes, so that they can see for themselves how false and exaggerated the camera can make them look if they try to act too hard."

"What's next on your slate, Mr. Thompson?"

"My next directing job will be *Taras Bulba*, based on the story by the Russian writer Gogol and starring Yul Brynner and Tony Curtis. But right now I'm going back to Hollywood to supervise the editing of *Cape Fear*, which I recently finished directing."

Cape Fear will probably be released at the end of the year—all the stronger, no doubt, for the loss of several lines, scenes and minutes of screen time.

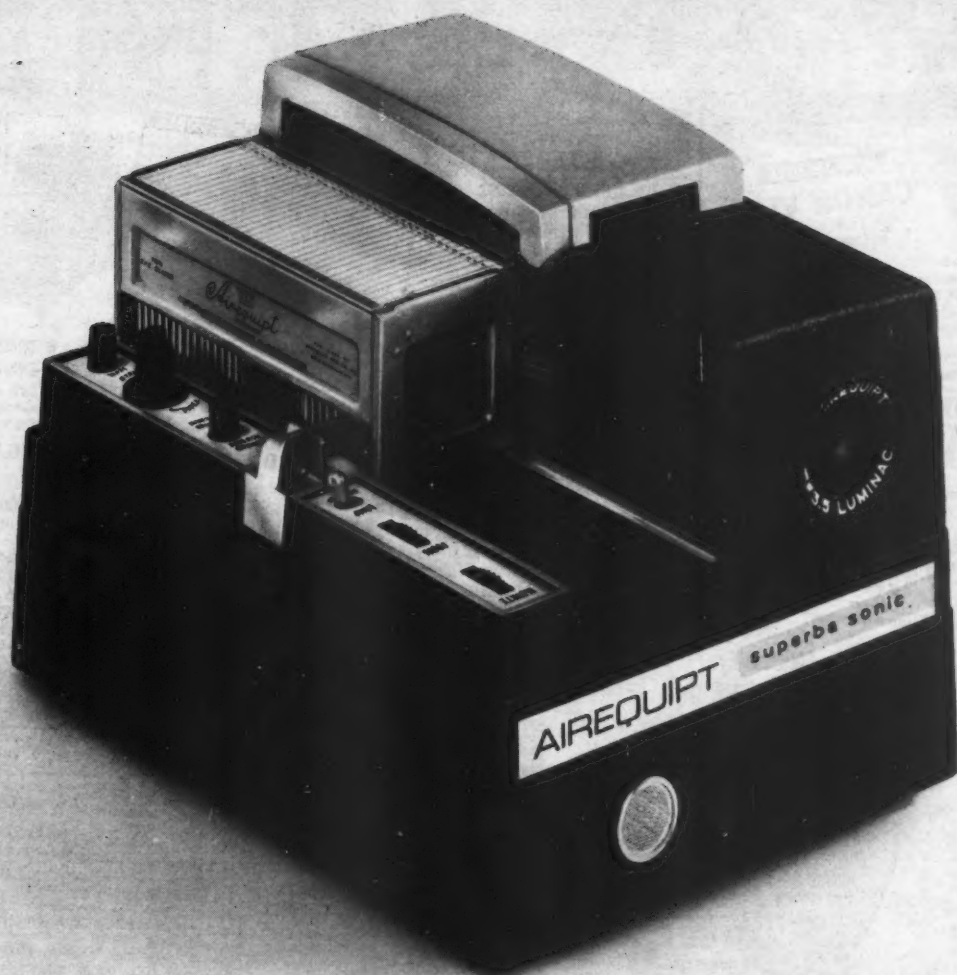
Around the releases

In this month's batch, technique is on a higher level than content. In *Paris Blues* (dir., Martin Ritt; phot., Christian Matras; b & w), the story of an American jazz musician in Paris is played against a half-dozen dissonant themes. Except for some blatantly artificial Paris backdrops, the movie is well enough photographed and crisply enough edited for you to enjoy it more than it deserves.

Mysterious Island (dir., Cy Endfield; phot., Wilkie Cooper; color) is the latest special-effects assault on Jules Verne. Here, too, the backdrops are the weakest spot; but the trick sequences involving a monstrous crab, etc., are well handled, being enhanced with quick-cut close-ups and blurred pans of the humans' reactions. In devoting such care to camera angle and movement, the director neglects the cast—but that's no calamity in this kind of fun.

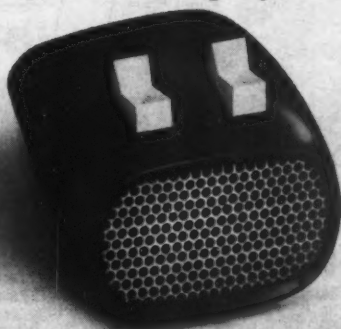
In *Purple Noon* (dir., Rene Clement; phot., Henri Decae; color), the director of *Forbidden Games* expends his talent on the story of a murderer so cold-blooded and a murder plan so full of holes that only the sheer efficiency of its telling and the magnificence of its photography hold one's

(Continued on page 43)



The slide projector with ears! This brand-new Airequipt Superba Sonic cuts the cord that has bound the remote control to the slide projector. It's equipped with electronic "ears" that hear the commands of a unique 4-way *wireless* remote control. Now you can run your slide show from virtually anywhere in the room—not just at the end of a cord. Just press a button on the simple remote control, and you can change slides forward and reverse, and even focus. You can't see it, feel it, or hear it work, but the remarkable new Superba Sonic obeys instantly. Ask your dealer to let you try "the slide projector with ears." **The Airequipt Superba Sonic**

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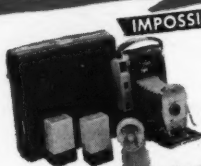


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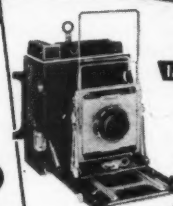
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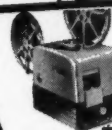
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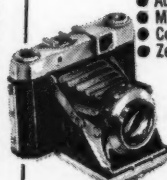


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16mm VISTASCOPE ... **36⁵⁰**

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- Weighs only 2 1/2 lbs.
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- Powered by 3 inexpensive batteries

BRAND NEW
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IMPOSSIBLE
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Ready-matic changer
No trays to buy
300 WATT, blower
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- 1/2" F1.9 Speed Lens
- Thru-the lens focusing
- Optical Individual Viewfinders
- 16, 24, 32, 48, 64 speeds
- Governor controlled motor
- Single Exposure



BRAND NEW
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PLAUBEL

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- Quick release back
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- Precision monorail
- Rigid locking

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- 4 x 5 Peco Jr. **\$235.00**
- 4 x 5 Peco Supra **\$228.00**
- 5 x 7 Peco Universal **\$255.00**
- 8 x 10 Peco Universal III **\$485.00**
- 2 1/4 x 3 3/4 Sliding Back For Roll, Cut Film Polaroid Back For All Sizes

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35mm CAMERAS	
Agfa Optima Auto	used 41.90
Agfa Karomat F2.2, synch. Rdr.	used 38.75
Alpa 68, Switzer 1.8	used 49.50
Alpa 7, Reflex F1.9, MX	used 119.50
Argus C3, F1.3, synch. Rdr.	used 11.50
Argus C4, F2.8, synch. Rdr.	used 19.50
Auto Terra Super F1.8, Rdr. synch.	NEW 39.50
B&H Foton, Rapid Sequence F1.8	NEW 165.00
Exakta V12, Meyer F1.9	used 98.50
Exakta V12 II, Hiotar F2.2 pre-set	NEW 127.75
Exakta II, Hiotar F2.2, synch.	used 49.50
Exakta V12, F1.9	used 68.50
Canoflex F1.8 auto, ext. mirror return	used 167.50
Contax III, Exp. meter, synch. Rdr. body	used 88.00
Contax III, Exp. meter, synch. Rdr. body	used 88.00
Contaflex Rapid Tess. 5.8	NEW 114.75
Contaflex Super, Exp. Meter	used 112.50
Contaflex I Tess 2.8 MX	used 49.50
Tele & W.A. set for Contaflex	NEW 284.50
Contarex, latest, Exp. meter cpld.	used 24.95
Exa Reflex, F1.8, MX synch.	used 49.50
Exa II, latest, Tess. 2.8 prism finder	used 89.75
Holland Pentax H-2, Auto F1.8	used 74.00
Kodak Ektra, Ektra F1.9, synch. Rdr.	used 68.50
Leica G, F1.8 ctd. Rdr. 1 sec. to 1/1000	used 39.50
Leica IIIF, Rdr. synch. F1.8 lens	used 35.50
Leica III Summar 2.8, Rdr. 1 sec. to 1/1000 body only	used 44.75
Leica IIIF, Summarit F1.8, Rdr. synch.	used 199.00
Leica M-2, Summarit F1.8	used 13.50
Minolta SR, Reflex, F1.8 auto	used 108.00
Minolta SR, Reflex, F1.8 auto	used 108.00
Miranda Summit, F1.9, latest	used 164.75
Nikon F, Reflex, F1.8, auto	used 88.00
Nikon S-2, Lever-wind, body only	used 129.50
Nikon S-2, Nikon F1.4	used 187.95
Nikon SP, latest, Nikon F1.4	used 187.95
Nikon Reflex F1.8, auto	used 84.50
Practica FX3, Auto-Turret F1.8	used 84.50
Practica FX3, F1.8, auto	used 84.50
Retina IIA, Xenon F1.8, Rdr.	used 98.75
Retina IIC, Xenon F1.8, Rdr. Exp. Mtr.	used 83.50
Retina III S, F1.8, Exp. Meter Rdr.	used 133.95
Retina Reflex F1.8, Exp. Meter	used 84.50
Retina Reflex F1.9, Exp. Meter LVS	used 84.50
Retina Reflex III, latest	used 84.50
Retina Reflex, Xenon F1.8, MX	used 84.50
Robot Star, Xenon F1.8, synch.	used 84.50
Robot Royal 98, Xenon F1.8, synch.	used 84.50
Seib 35mm Sequence camera F1.8	used 34.50
Yashica Pentamatic F1.8, MX, Rdr.	used 117.50
Yashica Prominent, Reflex F1.8, Exp. meter	used 49.50
Zeiss Ikoniz, F1.8, Exp. Meter	used 49.50

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21mm Bioton F4.5 Super W.A.	used 106.50
25mm Tessar W.A.	used 28.50
35mm Nikkor F1.8 W.A.	used 29.50
35mm Komura F2.8 W.A.	NEW 29.50
35mm Nikkor F1.8 W.A.	used 79.50
35mm Nikkor F1.8 Super W.A.	used 42.00
50mm Zeiss Bioton F1.8	used 162.00
50mm Nikkor F1.1 high-speed	used 49.50
55mm Nikkor F2.2, telephoto for Contax	NEW 79.75
55mm Zeiss Sonnar F2.2 tele	used 84.50
105mm Nikkor F2.8, for Contax	used 49.50
135mm Zeiss Sonnar F1.4, tele	used 49.50
200mm Sonnar F1.8, tele. hgh.	used 223.00
25mm Nikkor W. Reflex hgh.	used 68.00
300mm Zeiss Tele for Contax	used 1.75
Zeiss Universal	used 19.50
Zeiss Contax filters, all colors	used 19.50

LENSES FOR LEICA, CANON, Etc.	
21mm Super Angulon F4.5 W.A.	used 149.50
28mm Nikkor F3.5 W.A.	NEW 58.50
35mm Summaron F1.8 W.A.	used 39.00
35mm Summaron F2.8	used 128.75
35mm Nikkor F1.8	used 32.50
50mm Summarit F1.8	used 29.95
50mm Summarit Quinon F1.8 cpl. cpl.	NEW 34.50
50mm Canon F1.8	used 118.00
50mm Elmar F1.8	used 118.00
50mm Summilux F1.4	used 24.95
50mm Hektor F1.8, coupled to Rdr.	NEW 169.50
55mm Summarax F1.8	used 74.95
55mm Summilux F1.8, screw or bay	used 38.75
90mm Elmar F4 rigid	used 108.50
135mm Komura F2.8, screw or bay	NEW 59.50
135mm Hektor F4.5 telephoto	used 87.50
200mm Telyt F4.5, for Visoflex I or II	used 164.50
200mm Telyt F1.8, for Visoflex I or II	used 14.00
200mm Komura F4.5 RF	used 3.50
400mm F1.8, for Visoflex I or II	used 4.95
Universal Viewfinder	used 14.00
Nooky Close-up Attach.	used 14.00
Leitz filters, all colors	used 3.50
35-50-90-135 Luminous finder, each	NEW 4.95

16mm MOVIE	
Arriflex, Turret, electric motor	used 975.00
B&H 70DA, 3-lens Turret F1.8	used 74.50
B&H 70DR, F1.8, optical finder	used 188.00
B&H Turret Mag. F1.8	used 19.50
B&H 200EE, F1.9, Electric Eye Mag.	used 114.00
B&H 240EE, 100' roll, El. Eye	used 114.00
B&H 240TA, F1.9, 100' roll	used 118.00
Cine Special II, F1.9	used 138.50
Cine Spec. 100' Mag.	used 72.50
Cine Spec. 100' Mag.	used 68.00
Kodak A-7, F1.8, 100'	used 19.00
Kodak Mag. 16, F1.8	used 19.00
Kodak K10B, F1.9, 100' roll	used 138.50
Pathé 16, F1.8, 3-lens Turret	used 15.00
Revere Magazine	used 118.50
Zeiss AK, Turret, 100'	used 118.50
B&H Stateman, 750W projector, latest	used 49.50
Raystone A-82, 750W proj.	used 92.00
Ampro, sound projector	used 395.00
B&H Utility, sound proj., 12" speaker	used 92.00
B&H 202, Magazine & Opt. sound	used 395.00

LENSES FOR 16mm MOVIES	
12mm Wollensak F1.5 W.A.	used 36.50
17mm Kodak F2.7 W.A.	used 17.00
21mm Kodak F1.9, foc. mt.	used 19.50
21mm Kodak F1.9, hi-speed	used 34.50
25mm Kodak F1.7 telephoto	used 49.50
28mm Kodak F1.5, high-speed, telephoto	used 49.50
35mm Kodak F1.4 telephoto	used 39.50
50mm Kodak F1.4 telephoto	used 39.50
Vistascope Wide Screen lens	used 19.50

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Graflex Photo Record camera	used 32.50
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Super D Graflex, Ekstar 4.5 auto	used 98.00
Auto Roliflex, Tessar 3.5, Comput.	used 38.50
Auto Roliflex, Tessar 3.5, MX synch.	used 69.50
Auto Roliflex F1.8 LVS	used 97.00
Auto Roliflex 3.5 G, F1.3 LVS, Exp. meter	used 124.00
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Autoflex, Xenar 3.5, LVS	used 54.50
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Zeiss Rollet Duonar telephoto	used 29.00
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Auto Roliflex 3.5F, latest	used 148.00
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Kalimar Single-lens Reflex F1.8	used 48.50
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Minolta Autocord, auto, F1.8	used 59.50
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Optika Reflex, F1.8	used 109.50
Primo 4r, 4x4, F1.3 ctd. synch.	used 22.50
Yashica 44, F1.5 synch.	used 19.50
Yashica Mini, F1.8, synch. auto	used 38.95
Zeiss Ikoniz II, Tess. 3.5 synch.	used 38.50
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SLIDE PROJECTORS

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B&H Headliner, 300W, blower	used 34.50
B&H Explorer, 300W, remote	used 48.00
B&H Robomatic, 500W, case	used 48.00
Quick-set 303, auto, 300W	NEW 27.80
B&H 500W Explorer Auto	used 66.50
Revere 88SD, 500W, auto, Timer	NEW 79.50
Revere 500W Auto	used 32.50
TDC Duo, 2 1/2x3 1/4 & 3 1/2, blower	used 39.50



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Beesler 23 enlarger	used 79.50
Solar 4x5, 5x7 enlarger	used 42.75
Solar 16, Subminiature, Rdr.	used 148.95
Alpa clip-on Exposure Meter	NEW 4.95
Northwood Super Director w/case	NEW 11.95
G. E. Golden Crown, Exp. Meter, latest	used 15.50
G. E. DW 68 Exp. Meter	NEW 8.75
Cam-Blox Translucator	NEW 6.00
Rapid-Wind for Leica, Contax	NEW 1.95
Leitz Focallight copying attach.	used 24.50
Extension bellows for L.I. Reflex	used 13.95
Kodak Stereo, F1.8, synch.	NEW 29.00
Wollensak Stereo, F1.7, Rdr. synch.	used 99.50
Viewmaster Stereo camera	used 39.50
Minox IIIS, F1.5 synch.	used 47.75
Minox H, built-in Exp. Meter	used 82.50
Cam-Blox Translucator	used 159.95
Minicord Reflex, Goers F1.8	used 29.50
Copystand for Leica, Canon, etc.	NEW 32.00
B&H 770D Tape recorder	used 99.00
Mohawk, portable Tape recorder	used 99.00
F1.8 man, Translucator	used 99.00
Zeiss 750B Binoculars	used 69.50
Anaco Elevator Studio Tripod	NEW 34.95
Minolta 16 Subminiature	used 13.95
Mec 16 Subminiature	used 19.50
Golden Ricoh 16, F1.5, synch.	NEW 9.95
Mamiya Super 16, Subminiature	NEW 19.50
Ferrin leather Gadget bag	NEW 13.95

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B&H Sportster, 134V, F1.5, excellent	used 19.00
B&H 70DA, 3-lens Turret F1.8	used 34.50
B&H 900, Electric Eye, F1.9, fully autom.	used 34.50
B&H 303E, Electric Eye, 3 lenses	used 48.50
B&H 200EE, Electric Eye F1.9	NEW 114.00
B&H 414P, Power Zoom El. Eye	used 134.50
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Camex 8 with Pan-Clor Zoom lens	used 139.50
Canon Zoom 8, Reflex, Exp. Meter F1.4	used 139.50
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Eumig C3, Electric Eye, F1.9	used 24.90
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Revere 40, Mag. F1.8	NEW 19.00
Sekonic Elmatic F1.9	used 34.00
Sekonic Zoom, Electric Eye, pistol grip	used 68.50
Super GI, El. Eye, F1.9, battery drive	NEW 39.50
Wittauer Cine-Twin, camera & prod.	used 64.50
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Wollensak Power Zoom	NEW 48.00
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LENSES FOR 8mm MOVIES

6.5mm Wollensak F1.9 W.A.	NEW 14.75
1 1/2" Wollensak F1.9	NEW 9.95
1 1/2" Wollensak F1.9	NEW 9.95
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1 1/2" to Speed	used 14.95
Elgeet Zoom lens for 8mm Movies	used 24.95
Elgeet Synchroflex Electric Eye lens for all 8mm cameras, F1.9	used 14.95
Vistascope Wide Screen lens	used 7.50

PRESS, VIEW & ROLLFILM CAMERAS

SEE LINHOF SPECIAL ON OPPOSITE PAGE!

2 1/2x3 1/4 B&H Press, F1.4.5	used 31.00
2 1/2x3 1/4 Ann. Speed Graphic Tess. 5.8	used 38.50
2 1/2x3 1/4 Speed Graphic Tess. 4.5	used 39.50
2 1/2x3 1/4 Packmaster Graphic F1.4.7, Rdr.	used 69.50
3 1/2" Frons F1.4.5	used 49.50
4x5 Ann. Speed Graphic F1.4.7	used 24.00
4x5 Super Graphic F1.4.7, electr. shutter	used 189.50
4x5 Packmaster Speed F1.4.7, Rdr.	used 118.00
K10 B&H View camera	used 78.00
4x5 35mm View Camera	used 34.95
4x5 35mm View Camera	used 82.50
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Plaubel Makina F1.8, Rdr.	used 28.50
Polaroid 150, Rdr. synch.	NEW 48.50
Polaroid Exposure Meter 29B	NEW 1.75
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Compur shutter 0	NEW 1.95
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2 1/2" Kodak F1.4.7, Supermatic	used 19.00
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3 1/2" Zeiss Tess. F1.4.7	used 19.50
3 1/2" K.A. F1.4.5 Supermatic	used 24.50
3 1/2" Goers F1.4.7	NEW 28.00
3 1/2" Goers Dogmar F1.4.7	NEW 28.00
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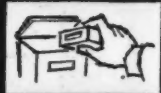
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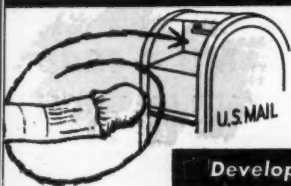
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35MM

BY JOHN WOLBARST

At last, Ansco markets Hyfinol, a
really remarkable new developer,
and I get off the hook.

In my Master Chart of 35mm & Roll
Films & Conventional Developers,
which appeared in the March 1961
issue of MODERN, I included considerable
information about Ansco Hyfinol,
a new film developer. Apparently I
was a bit ahead of time, for Ansco
has just now announced that this product
is coming on the market. However,
its characteristics have not been
changed, so my previously published
data on Hyfinol still apply. Perhaps
now readers will stop beating me over
the head with letters asking why I
sent them walking through five camera
stores looking for something that
doesn't exist.

Anyhow, Hyfinol is quite a developer.
It's a fast-acting, energetic but
soft-working formula designed to give
a combination of high film speed, reasonably
fine grain, and better image
sharpness than ordinary fine-grain
developers. It seems to be somewhat
similar in performance to Ethol UFG
and Acufine, but it has its own distinguishing
and exceptional characteristics
and advantages.

From good to outstanding

Hyfinol was designed specifically
for Ansco films and, in particular, for
Super Hypan. This film/developer
combination is, in my opinion, a spectacularly
successful one. It seemed to
me that the results with Super Hypan
were the best I've had with that film.

Hyfinol also gave good results with
Kodak films. However, in terms of
image quality it appeared to offer no
advantage over the results I had been
getting with Kodak films and other
developers. Exception: It seemed to
me that Hyfinol was the best formula
I had ever used with Kodak Royal-X
Pan, a film that has been notably un-
responsive to almost anything but
Kodak DK-50.

Ansco makes some rather big
claims for the performance of Hyfinol.
I found them to be pretty reasonable,
in comparison with the results I got.
Here's a summary of my impressions.

Film speed: Exceptionally good with
Super Hypan and also with Agfa Iso-

(Continued on page 40)

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35MM

(Continued from page 38)

pan Record and Kodak Royal-X Pan. Any developer which exploits fully the inherent sensitivity of a film as fast as Super Hypan is giving you a lot of film speed. However, this is no invitation to use highly inflated and unrealistic film-speed settings for your meter with the Super Hypan/Hyfinol combination. I found that an exposure index of 500-650 in daylight, using an incident-light meter or a reflected-light meter against a gray card, produced almost perfect negatives. I might add that I have never used any developer with Super Hypan which produced more real film speed than Hyfinol did, with comparable image quality. Promicrol, for example, appears to give much more film speed than Hyfinol, but the images lack the excellent definition and sharpness that Hyfinol gives.

Contrast: The recommended development produced negatives of moderate contrast which printed easily. There was beautiful separation of

IN NEXT MONTH'S MODERN

Giant guide to new cameras!

tones throughout the entire range from shadows to highlights, with no tendency for the highlights to block up. With Super Hypan, extended development produced only moderate increases in contrast. So, if you believe in "pushing" development (I don't) this is a good combination.

Fog level: Hyfinol produced very little fog with normal development. Negatives were clean and crisp-looking. This applied even to Royal-X Pan.

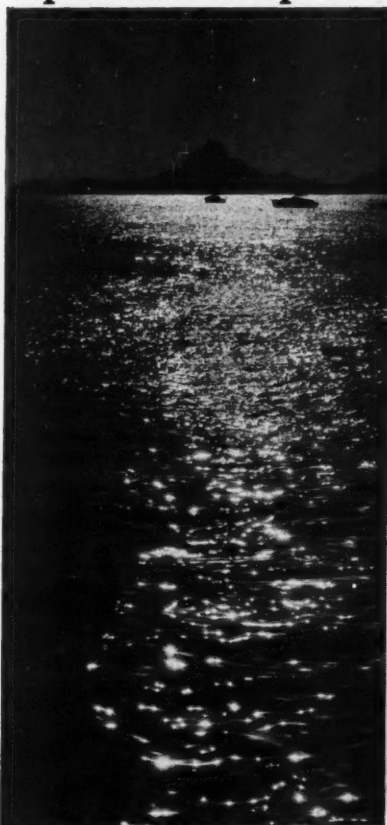
Graininess: I wouldn't call this an ultra-fine-grain developer, but it certainly is in the fine-grain category and seems to be at least a match in this regard for other products of the same general type, and superior to some more expensive, highly touted ones.

Sharpness: Apparently much better than anything I have been able to achieve with any previous Ansco developer, and quite on a par with the results produced by similar energetic developers. There is an excellent compromise between low-graininess and maximum sharpness. After all, Super Hypan is a very fast film and no matter what you do with it the negatives won't be as grainless and sharp as if you'd used Adox KB-14. Despite this, my Super Hypan negatives produced prints which looked very sharp, even when greatly enlarged.

The most unusual claim for this developer has to do with its working life and keeping qualities. I quote: "Without replenishment, and with no increase in processing times, Hyfinol

(Continued on page 42)

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35MM

(Continued from page 40)

will develop far more film than existing developers of its type. Under controlled conditions, Hyfinol will develop over 100 8 x 10 sheet films or 120 rolls per gallon."

Since a gallon of Hyfinol costs only \$1.65, this must be potentially one of the most economical developers to use. I say "potentially" because I'm not exactly sure what Ansco means by "controlled conditions." Your own operating procedures might be more wasteful of developer or might cause more rapid deterioration.

I did not develop 120 rolls in one gallon of Hyfinol, and I did not conduct the precise sensitometric tests needed to ascertain that the results with the last roll exactly matched those achieved with the first roll. But I did develop enough rolls to be impressed by the exceptionally long life and outstanding keeping qualities of Hyfinol. Roll after roll went in and came out looking just dandy. It was obvious that Hyfinol's abilities in this direction were unique.

There is also a replenisher (\$1.65 per gallon) which is said to give consistent results. I didn't test it, since there are many developers which can be replenished successfully and there was nothing unusual about this.

Summed up, my experience with Hyfinol was that it was not cranky, needed no special handling, proved to be extremely reliable, and just kept turning out A-1 negatives for an amazingly long time.

Here are some developing times in minutes for 35mm and roll films, based on a temperature of 68°F, with agitation 5 sec. every 30 sec. An "x" indicates what I consider to be a particularly successful combination.

Ansco All-Weather Pan	6-7	x
Ansco Super Hypan	7-9	x
Agfa Isopan Record	7-9	x
Kodak Plus-X Pan	4-5	
Kodak Tri-X Pan	5-6	
Kodak Royal-X Pan	8	x

Development of Royal-X Pan can be extended to 12 or 16 min. for maximum film speed with low contrast subjects, but with some loss of quality.

Hyfinol is also designed for use with sheet films, but that's outside the boundaries of this column.—THE END



MODERN COLOR

(Continued from page 22)

showed that a developer temperature variation of as much as $1\frac{1}{2}$ to 2 degrees still produced prints of good quality. The developer can be stored unused from 4 to 5 weeks before it should be discarded. According to the manufacturer, FR paper can be stored in room temperature.

It is too early for us to draw a final opinion of this new color process. Remember, we worked with just a sample kit. The present paper is made in England, but a faster, U.S.-made paper, possibly having different characteristics, is promised at a future date. And there might be other changes.

Undeniably, the process does simplify color printing. It certainly takes less time to make the test strip and first print than the standard method. It doesn't involve an endless number of filters. Lights can be turned on at an earlier stage. You can make several prints in one evening and correct color balance and exposure as you go along.

How did our FR color prints compare with regular Kodachrome prints? They were lower in contrast and colors were softer and less saturated. Prints of good quality can definitely be made. The neophyte may find it necessary to make 2 or 3 pilot prints before achieving an acceptable one. As in all color printing processes, experience will play an important part.—THE END

MOVIE VIEWER

(Continued from page 30)

attention. Decae conjures striking color out of everything from street scenes at night to extended sailboat scenes in brilliant sunlight, with interiors cunningly planned in cool whites, blues and oranges to match the Mediterranean exteriors.

Scream of Fear (dir., Seth Holt; phot., Douglas Slocombe; b & w) sets out to horrify, and is pretty successful.



Purple Noon: murderer and victim.

ful. The plot is over-ingenious, the treatment (apart from some self-conscious framings and camera movements) superb. Among many achievements, Slocombe gauges the precise lighting and exposure to make an ordinary white car look sinister or lead us to gradually perceive a corpse in a shadowy armchair.—THE END



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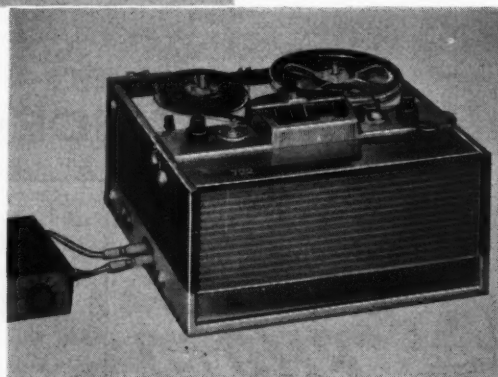


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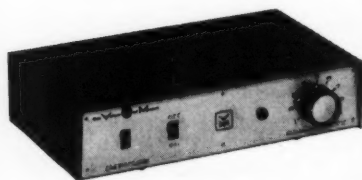
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NEW BOOKS

(Continued from page 27)

too sharply delineated Martha Graham and Hugo Erfurth's Mary Wigman (the last would give retouchers a field day, and they'd ruin it, of course).

Gruber has made quite clever use of just such juxtaposition to let the pictures make their own editorial points. Naturalist Alexander von Humboldt photographed by Biow in 1847 shows the same deep-set, world-weary, knowing eyes as Philippe Halsman's Albert Einstein of 1949; Arnold Newman's sharply chiseled, sparkling J. Robert Oppenheimer contrasts markedly with the graying 1958 Oppenheimer of John Vachon. Newman's great classic double portrait of Alfred Stieglitz and Georgia O'Keeffe with its simplicity of line and clarity of detail faces a wildly stunning Erfurth double portrait of Marc and Bella Chagall.

Besides the capsulated biographies of the subjects and photographers, Gruber has written a masterfully concise introduction covering the history of portraiture, where photography stands in it and how portraits have changed through the years.—H.K.

ROME FOR OURSELVES, by Aubrey Menen, 151 photographs, 244 pages. McGraw-Hill Book Company, Inc., New York, \$15*

Besides being a highly caustic, witty raconteur of facts, whimsies and rumors about a city in which he had lived for years, Menen has a taste for visual excitement. This magnificent, over-sized Romantic rhapsody bounces along with a great variety of trends including ancient paintings in full color, 18th Century paintings of contemporary Roman life (including an absolutely dazzling double-page spread of the Piazza Navone flooded with water) and photographs. And what photographs! Menen has assembled truly exciting pictures of Roman statuary, monuments and buildings—the same tired ones shown a million times from the same tired angles take on new impact when seen through new eyes. The eyes are those of Italian photographers up to now unknown to this reviewer.

It would be untrue not to admit that a goodly number of dullish sceneries were included. However, they are mercifully small in size (and only these are small, all the good photos are big).

The book is beautifully bound and splendidly designed.—H.K.

KIPPY THE KOALA, pictures by George Leavens, words by Crosby Newell, 32 pages. Harper & Brothers, \$2.50

A lovable animal is mistreated by very inferior picture reproduction and a large percentage of photographs whose blur and lack of separation of the main subject from the background make them unsuitable for a child's book.—H.K.

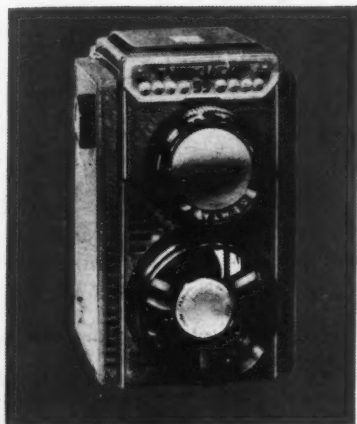
*These and other books are available through AMPHOTO, 33 W. 60 St., N. Y.

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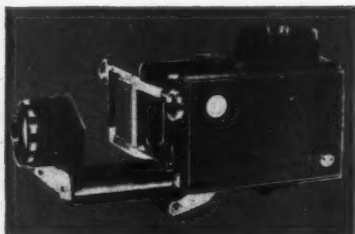
(Continued from page 17)

Curiouser & curiouser

Every once in a while a slew of fairly peculiar equipment is manufactured in Japan which leaves us (and many Japanese too) slightly puzzled. You may remember the ultraminiature camera jutting from the front of a dummy Colt 45 pistol which loaded up with flashpowder shells, and the camera built into a pencil (or was the



Surely it's a twin-lens reflex? . . .



. . . Oops, it's a slide projector!

pencil built into a camera?). The Ramera, of course, is a combination radio and camera.

This month we feature the Flexilide 35 twin-lens—oops, we mean slide projector. When closed it looks like a twin-lens reflex. Twist upward on the "viewing lens" and *voila!* (or Japanese equivalent) we have a small manual 35mm slide projector. The "taking lens" of the dummy twin-lens reflex is really the top of the lamp housing.

No, we do not know if, when, where or by whom this unit will arrive here.

New ways for 8mm sound

Magnetic striping of 8mm movie film hasn't completely overcome the idea of using a tape-recording machine with a standard projector. The German electrical giant, Siemens & Halske, who make a great portion of the professional movie projectors in Germany, have just introduced an interesting unit. The 800 Siemens Projector has an independent tape unit built right onto

(Continued on page 46)



DYNAMATIC meets new love

Why Dynamatic? Because this unique automatic camera gives you the most thorough light reading of all. It balances the values from its "three-eye" system — instantly determines proper exposure. And it continues to adjust for any perceptible light value changes *right up to the moment you shoot*. No other automatic camera is quite like it. See the Dynamatic with f/2.8 Voigtlander lens, just \$104.50*; Dynamatic II, with coupled rangefinder and free choice of manual setting when desired, \$139.50*.



* Manufacturer's suggested list prices. See your dealer for his prices.

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A high quality lens is priceless. However, price alone does not determine quality. The inherent ability to produce razor sharp pictures, in both color and Black and White, is the final consideration.

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() Telephoto Lens () Long Telephoto Lens

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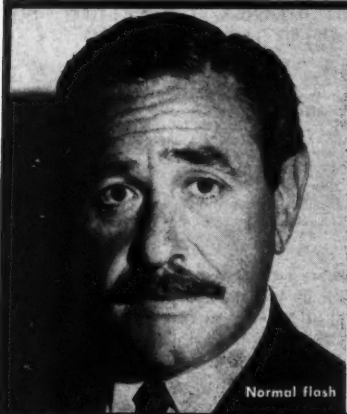


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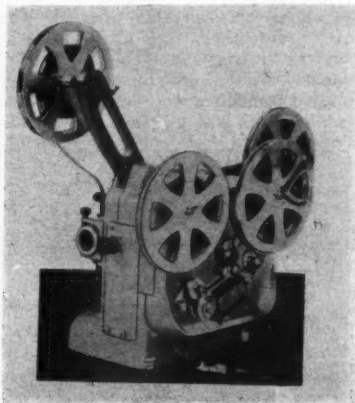
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BEHIND THE SCENES

(Continued from page 45)

the side of their projector. It's synchronized sufficiently well, the makers claim, to deliver full lip synchronization. Advantage over 8mm film strip-



New 8mm sound system?

ing? Better sound and higher fidelity because of the wider tape.

This coupling of tape machine and projector isn't a new one. Siemens already has done it in 16mm. Don't hold your breath until it arrives here. No Siemens products have been officially imported for the amateur market since before World War II.

Zoom plus meter

Right after the first zoom lenses appeared built into 8mm movie cameras, enterprising lens makers introduced zoom lenses to convert older non-zooming cameras into up-to-date models. Then came the through-the-lens finder cameras—again lens makers gave us auxiliary lenses with similar finder systems. In like manner automatic exposure electric eye cameras were followed in short order with inter-



Zoom plus reflex plus meter.

changeable lens-meter units for those who refused to part with their older cameras.

Next in the build-up-your-own-camera line is a combination zoom lens with through-the-lens finder plus coupled exposure meter.

This unit, the Chinon 8mm Reflex Zoom lens, is not fully automatic. It uses a matched-needle setting system but the needle is conveniently visible right in the finder. Other details: f/1.8 maximum aperture, 10 to 30mm zoom range, ASA indexes 10 to 40.

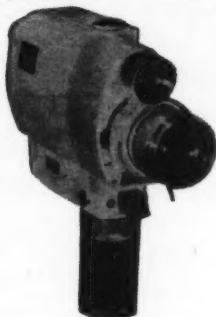
Now how about a completely automatic camera body for those of us who want to keep our old lenses?

New Topcon SLR

A new Topcon R single-lens reflex will soon be announced by the maker, Tokyo Optical Co., Ltd. The new R model, which resembles the present C, retains all the well-known features and general body design but has a single non-rotating shutter-speed dial and provision for a clip-on exposure meter which couples to the shutter-speed dial.

Minolta enters 8mm

Minolta will enter the 8mm movie field with the Minolta Zoom 8, a fully automatic electric eye camera with a 10 to 30mm f/1.8 Rokkor lens, electric motor powered by four penlight cells



By radio control, too!

contained in the pistol grip. Interesting features: split-image rangefinder in the viewing system, provision for radio remote control.

Faster glass

The old trend toward superfast lenses has not been completely discouraged by the introduction of faster color and black-and-white films. While waiting patiently for production of the Canon 50mm f/.095 rangefinder camera lens, we hear that Komura is adding an 85mm f/1.4 to their line for eye-level reflex cameras.

Color in 20 sec.?

Like to have full color pictures in less than a minute? Well, you can. It only takes a Kelvin & Hughes Rapid Processing Photographic Projector 20 seconds to deliver a perfectly dry transparency with the new Ilford Bi-Pac reversal recording film. Before you ditch your Polaroid Land camera and all your Kodachrome film, we should explain that the processing unit is sufficiently portable to carry around with you if you have your own good-sized pick-up truck. You may not be completely happy with the film either. Oh, its color is all right—red, white and green on a purple background. Before you try to decide what subjects you know are red, white and green and would look good against purple, we should explain that the film and processing unit are available only for cathode ray photography. The color does not represent the true color of the subject, but it's only color differentiation that's needed in cathode ray work. Still, someday. . . H. K.



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25' Double 8mm KODACHROME TYPE A...Proc. Incl.	5.50	13.50	26.40
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Black & White Film may be purchased, Processing not included.
For Fairchild Camera
Can be used in Fairchild Camera for shorter films or in any silent 8mm camera where sound is to be added later.

COMPARE WITH POST-STRIPING PRICES.

POST-STRIPING

(Magnetic striping of film already processed) 8mm or 16mm

50 Ft. Roll	\$1.50
100 Ft. Roll	2.75
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by MYRON A. MATZKIN

Sound, Part II: How the human voice can be used to give your films a sense of reality and presence.



We're immersed in sound every minute of the day. Everything we see and touch has a sound of its own—a hammer striking a nail, a musical instrument being played, an airplane in flight, a child taking a fall or the movement of someone's lips. A totally silent film has an unreal quality that makes us terribly conscious that what we see on the screen is nothing more than an illusion.

How much of all this sound do you need in your films? And how much can you use? The type of sound that most often springs to mind in connection with movies is the human voice, particularly the matching of speech with image that's known as lip-synchronization. Obviously, there's a tremendous sense of realism when people actually talk on the screen.

Right now, only one 8mm camera, the Fairchild Cinephonic, records both image and sound while you shoot (called single system). The sound is recorded on pre-stripped film and is synced to lip movement.

Frankly, anything but single-system lip sync is bound to be fantastically difficult for the amateur. Exact post-synchronization—where sound and image are recorded separately—is extremely difficult and tedious.

You're not sunk without sync

However, you can achieve what appears to be but actually is not lip-synchronized sound. There are no technical difficulties: you merely need a tape recorder in addition to camera and 8 or 16mm magnetic sound projector. Image and sound are recorded separately, then joined on one strip of magnetically striped film. The impression of lip-sync will depend on what you shoot and record.

If you saw *The Little Fugitive*, a film by Morris Engel and Ruth Orkin, you

(Continued on page 50)

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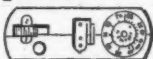
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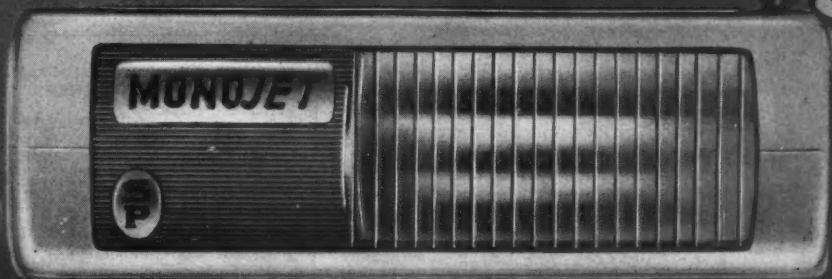
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MOVIE MAKER

(Continued from page 48)

may remember a scene showing a long shot of the little boy and his brother in which one calls the other. The sound seems to be synced, but actually it isn't. The characters are too far from the camera for you to actually see lip movement—but the suggestion that lips and sound are working together is quite effective.

Here's how you might use the same idea. Suppose you make a long shot of your youngster playing with some rather involved educational toy. At

MOVIE TIP OF THE MONTH: Since Kodachrome II is 2 1/2X faster than regular Kodachrome there's much more danger of light streaking film edges when loading or unloading a roll film camera in bright sunlight. Either change film indoors or use a changing bag for complete safety. It takes a little practice to work by feel alone—but it's worth it in saved footage.

some other time you record his comments on what he's doing. Joining the two on magnetically striped film will provide a strong sense of realism to the footage.

Even scenes where there's no intention of implying that the words are synced can be effective. For example, you shoot footage of your child in his crib, just looking at his world. You've recorded some of the things he's said in the past few days. Joining the sound and image together provide a kind of stream-of-consciousness effect that delves into the baby's thoughts.

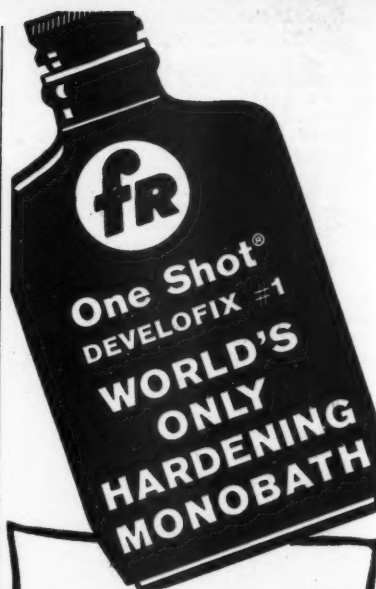
An excellent way of turning non-sync into what seems like sync is to use off-screen sound. For example, the image shows your wife in the kitchen, while the sound track has the baby's voice calling for his mother from another room. If you plan this type of shot, you can have your wife react to the baby's cry even though he's happily sleeping when you shoot.

Talking about the image

Commentary is another use of voice sound. Most often, commentary or description is used with documentary or travelogue films. But if used with restraint, it can be brought into most types of film to point out a missing fact or highlight the importance of an image that may not be overly strong.

For example, a shot of a tall building might be enhanced by telling the audience how many stories there are in the structure, the name of the building and what it's used for. On the other hand, it might be superfluous to point out that it's an office building, if people are shown hurrying in and out on a

(Continued on page 58)



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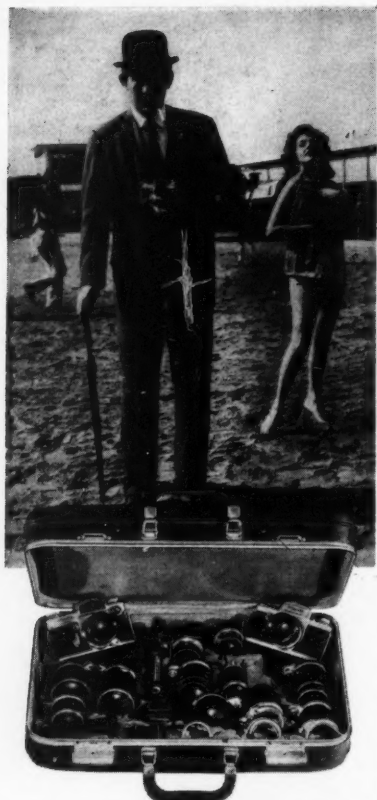
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THE WELL TRAVELED CAMERA

by the editors

Shooting color on your vacation, Part II: Accessories whose value is greater than their bulk.

In Part I—back in the July 1961 MODERN—I discussed what camera and film you should take on vacation. But it's also important for you to take just the right choice of small accessories. You can probably think of dozens that *might* be useful; however, I'm going to list here only the ones I think are a must. They are:

Skylight (1A), UV or haze filter: You can't see ultraviolet rays, but your color film does, translating them into visible blue. Insurance against pictures of landscapes, seascapes and aerial shots that are veiled by a bluish cast is to employ one of these filters to cut the UV out. The Skylight and UV also give improved rendition in open shade and on overcast days. No change in exposure is needed.

Polarizing filter: Useful in removing reflections from non-metallic objects. With reflections removed, many objects such as leaves, foliage, roofs of buildings reveal their own color fully, the result being color slides with higher color saturation. Polarizers are also useful to remove reflections from water, revealing detail below; and to darken a blue sky for dramatic effects. It's the only known filter that will penetrate mild visible haze in color work.

Neutral density filters: These enable you to use high-speed color at wider apertures to throw backgrounds out of focus, or to cut down the light when it is so bright you can't stop down far enough even though you're using your camera's highest shutter speed. N.D. filters are gray and don't change color rendition. The most useful densities are 2X, 4X and 8X.

Flash and electronic flash: With the advent of tiny AG-1 lamps there's hardly any excuse at all not to take along one of the diminutive guns made for these, and a supply of lamps. Blue AG-1B lamps are recommended for use with daylight films, indoors and for fill-in flash to soften shadows outdoors. White bulbs require no filter on Type F films; an 81C filter for Kodachrome Type A and High Speed Ektachrome Type B and an 81D for Super Anscochrome Tungsten Type. If you're not carrying too much equip-

ment already, seriously consider getting one of the new, small yet powerful strobe units.

Tripods: For interior time exposures, for close-ups, for maximum depth of field with small apertures and slow shutter speeds, and for really sharp color slides, a tripod is generally a must. It's not necessary to take a heavy studio model, but at the same time don't waste your money on a flimsy job to save weight. If you only have occasional use for a support, it might be a good idea to invest in a light, compact device such as a Linhof Clampod, Heiland Fotoclamp, Kodak Flexiclamp or Rowi Clamp. These attach to a chair, fence, table, door or any other similar support.

Exposure meter: When shooting under familiar circumstances you may be able to rely on experience. But abroad, lighting conditions may be quite different from what you encounter at home. Whenever in doubt,

IN NEXT MONTH'S MODERN

It's time for the annual Used Camera Buying Guide, which this year is far bigger than ever before.

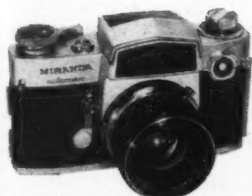
bracket your exposures on important shots, making one shot at the metered exposure, one at $\frac{1}{2}$ stop less one at $\frac{1}{2}$ stop more for Kodachrome, and with a 1-stop variance for other color films.

Gadget bags: I prefer the "pro" type of gadget bag, which not only has a shoulder strap but a handle as well, thus letting you take the load off your shoulder when you want to. I always take two bags. One is a large bag which holds all my cameras, lenses and important accessories. The other smaller bag is used to take along only the things I actually need for a particular shooting session. The balance of the equipment I check with the hotel management.

Changing bag: Should the end of an important roll of 35mm film come off the spool, a changing bag will save your pictures. It can also be used to load film holders, remove and replace

(Continued on page 58)

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ultra MINIATURE

BY JOSEPH D. COOPER

More about shooting close-ups: specific techniques for flowers, architecture, copying.



In last month's column, I discussed the techniques for close-up work with ultra-miniature cameras in general, covering the closest working distances, framing, parallax, depth of field and

sharpness. Here I would like to deal more specifically with several of the subjects which you will be shooting in close-up.

Flowers: Distracting backgrounds are one of the main problems encountered

when photographing flowers in the field. The disorganized mass of other flowers, stems, grasses, etc. in the background distracts from the main subject unless kept completely out of focus by a wide aperture. The simplest solution is to place a cardboard or piece of stiff paper immediately behind the flower you plan to shoot. Choose a color (if you are working in color) or a tone (if you are working in black-and-white) which will contrast with the flower.

For complete isolation

If you want to eliminate all traces of texture or detail in the background, have a friend move the cardboard while you make the exposure. You will have to use a time exposure in order to do this, which means that you must have the camera resting on some kind of solid support or else use a tripod.

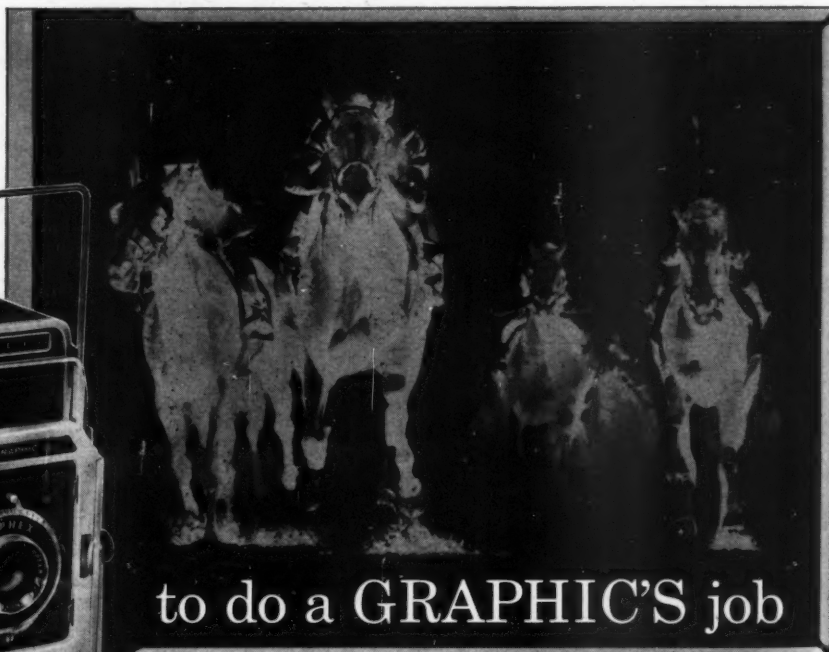
Dramatic effects can often be obtained by shooting flowers by back-light. The petals will appear delicate and translucent, and the texture of the veins will be apparent.

Architectural details: When shooting such subjects as an ornately carved door, take care that the camera is parallel to the subject. If you shoot at an angle from a close distance, part of the subject will probably be out of focus even if you are using an extremely small aperture. Sidelight is best to emphasize texture and design; but if the light is very harsh and contrasty, you will find a reflector useful to cast some illumination back into the shadows.

Copying: When photographing documents, coins, or any other small objects which can be placed on a horizontal surface, the easiest and most dependable method is to use one of the special stands available for this purpose. The Minox copying stand includes a camera holder and four sets of legs. You vary the length of the legs, and the camera-to-subject distance, by screwing on extensions. If you are photographing flat copy, set focus as indicated by the length of the leg extensions. If the surface of the subject is not level with the base, measure the actual distance from camera to subject with a tape measure, and set focus accordingly. A spe-

(Continued on page 66)

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Make Your Own Land Camera

When we have it to the ears with zoom lenses, rapid sequence cameras and super automatic 35s, we often sit around and mentally redesign Dr. Edwin H. Land's cameras for him. Among our fond desires has been a smaller, pocketable Polaroid Land camera with a good lens and shutter. There is available a small pocketable Polaroid-Land 80a camera producing 8 2¼ x 3¼ pictures on a roll of Polaroid-Land film. However, by any standards, its lens and shutter are rather basic. The 100mm f/8.8 lens aperture controls are coupled to the shutter speeds (1/25 to 1/100) and you must select an EVS pairing.

Maynard Frank Wolfe, one of our favorite contributors and a man of action, took the matter in hand. He noted that there were many good used 101mm f/4.5 Kodak Anastigmat Special lenses in synced Supermatic 1 to 1/400 sec. shutters on dealers' shelves. These had originally been on various Kodak Tourist 2¼ x 3¼ roll film cameras. He purchased one for \$20, and for \$18 he had a repairman mount and align it to a used \$25 80a camera body with a broken shutter. Presto, he had a Polaroid Land 80a Wolfe Special.

But what's it for?

Now you might wonder why anyone would go to so much trouble. Aside from the excellent pictures the camera takes, it can be employed as a testing instrument for shooting color film in all types of light including electronic flash. Wolfe uses the Polaroid Land film with an exposure index of 400. By fastening an N.D. filter with a factor of 8 over the camera lens he, in effect, reduces the film's index to 50, the equivalent of Ektachrome E-3. For Kodachrome (E.I. 10) a filter factor of 40 should be used ($400 \div 40 = \text{E.I. } 10$). Both Kodak and Tiffen make a complete line of N.D. filters. Incidentally, when you can't get a filter with the right factor, you can use two and multiply the factors together (for instance, nobody makes a N.D. filter with a factor of 40, but, you simply use a combination of a 4X and 10X).

By using the right N.D. filter, you have a first-class test camera which will tell you instantly whether your color shots will be under- or overexposed. If you get a bad Polaroid print, you adjust and reshoot until exposure is correct. The cost of a single shot of the 80a is only 23¢, far less than the cost of wrecking a whole roll of color.—H.K.

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MOVIE MAKER

(Continued from page 50)

busy weekday morning or afternoon.

Most important, a voice commentary or background can set a mood. This is done with extremely good effect in *The Black Cat*, a short film based on Edgar Allen Poe's story. The film employs still pictures done in water colors to supply the image. A voice simply recites the story of the black cat. Never does it intrude on the image—or become more important than what's on the screen. Rather, the voice in the background serves to accentuate each scene, making it stronger and more believable. At the same time, it supplies a continuity that might not be obvious from the pictures alone.

We've talked only about the human voice on sound tracks this month. Next month we'll discuss music backgrounds, special sound effects, and how you can record your own sound in the field using comparatively low-priced battery-powered tape recorders.

—THE END

News from the mysterious east
"Getting into a close connection with Polaroid Rand Co., Yashica Co. Ltd., is going to produce Polaroid camera in Japan starting this year."—From Photo Trade of Japan #19, 1961.

WELL TRAVELED CAMERA

(Continued from page 52)

partially exposed rolls of film, and load developing tanks for spot-check processing.

Miscellaneous: A small flashlight will enable you to see camera markings. There's nothing more exasperating than to be without a cable release, case retaining screw, or the screw that holds camera to a flash bracket. Play it safe and take extras along. Last but not least, check with your travel agent, or the consulate of the country you intend to visit, about regulations regarding the number of cameras and rolls of film you can take along.

Kodak's and Ansco's fine data books contain lots of helpful information on exposing color film under a variety of indoor and outdoor picture taking situations. Recommended reading includes: Kodak's *Vacation Europe With Your Color Camera*; *Vacation Caribbean With Your Color Camera*; *Vacation South of the Border With Your Color Camera*; *Adventures in Outdoor Color Slides*; *Adventures in Indoor Color Slides*, all at 50c; *Vacation U.S.A. With Your Color Camera* at 75c; and Ansco's 50c booklet *Color Fun With Anscochrome and Super Anscochrome Films*.—NORMAN ROTHSCHILD



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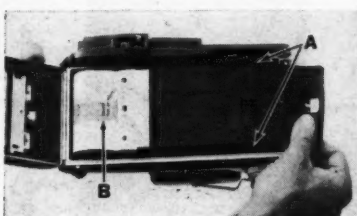
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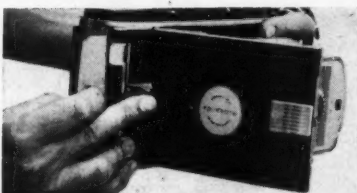
(Continued from page 18)



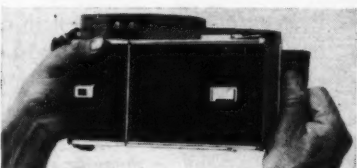
7. Close inner back over leader. Pull leader gently until stars and line (arrow) are visible next to roller.



8. Carry leader over to other side of camera, lay it between guides (A). Don't break positive roll seal (B).



9. With base of left thumb, slowly close outer back over leader; close back lock with right hand.



10. Firmly grasp leader between thumb and folded fingers. Don't use just fingertips; hold it solidly.



11. Hold camera at angle shown and pull leader straight out about 15 in. until film hits stop. Look under cutter bar and you should see "STOP. Picture Number 1 ready to take." Close cutter bar and tear off leader.—THE END

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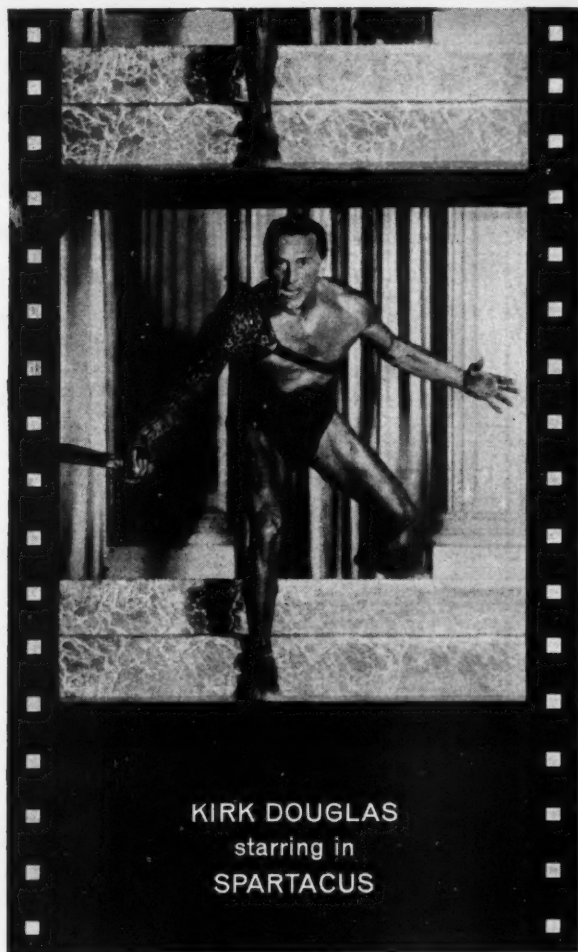
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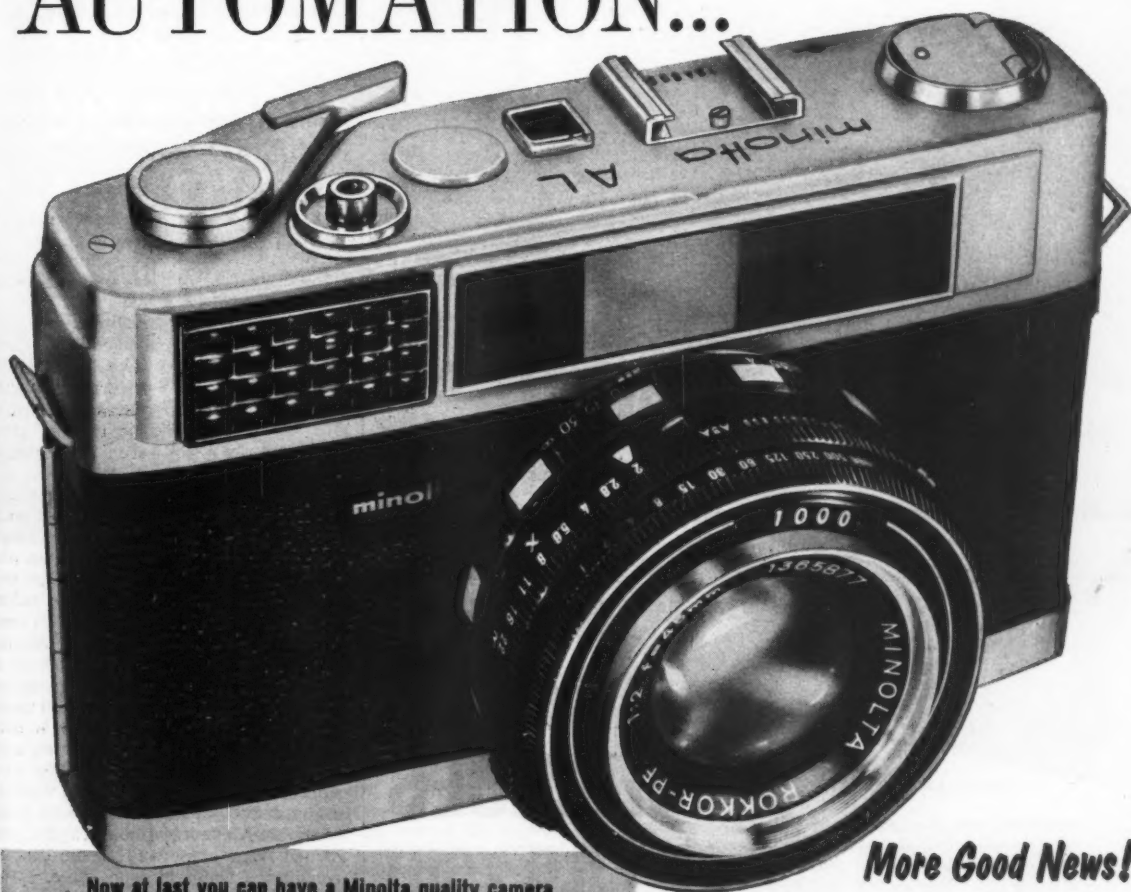
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LARGE camera

BY ANDREAS FEININGER
Staff Photographer For Life Magazine

"Life" photographers and large cameras, Part I: An interview with Eliot Elisofon.



Again and again, people ask me which camera is most popular with *Life* photographers. To answer this question, I interviewed several photographers and asked them what cameras they owned,

which they used most, and when and why. My survey showed that the majority (85%) of all *Life* photographs, black-and-white and color, are taken with 35mm cameras, with Leica and Nikon leading and Pentax a good second; 10% of all pictures are taken on 2 1/4 x 2 1/4, and 4 x 5, 5 x 7 and 8 x 10-in. cameras account for around 5%. However, although the 35mm is unquestionably the bread-and-butter camera, the large camera scored much higher as far as importance is concerned. Of all photographs taken with small cameras, some 5% were considered memorable, compared with as many as 30% of those taken with large cameras. And every photographer who owned large cameras told me that he considered them indispensable.

Half his pictures are "large"

Eliot Elisofon, who probably travels more miles per year and produces more big picture stories than any other *Life* photographer, owns and constantly uses three large cameras: a 5 x 7 Peco, a 4 x 5 Linhof Technika, and a 4 x 5 Deardorff. In fact, Elisofon uses large cameras for an estimated 50% of all his pictures. Of course, he specializes in photographing subjects that are particularly suited to the large camera: landscapes, still lifes, works of art and his big specialty, food.

Elisofon likes large cameras for three reasons. First, he can see what he is doing—how far sharpness in depth extends, how distant background

(Continued on page 66)

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LARGE CAMERA

(Continued from page 64)

detail will appear, what's in the extreme corners, the interrelationship of objects in the photograph.

Second, he needs privacy to concentrate on composing the elements of the picture. This, he maintains, can be achieved most easily with the black focusing cloth which shuts out distractions and permits him to give his undivided attention to the picture.

Third, large cameras have certain technical advantages over smaller cameras—superior sharpness of rendition, swings and tilts for perspective control and extension of sharpness in depth without excessive stopping

down. There is also the perhaps unjust but nevertheless true fact that, laid out on the light-table before the editorial eye, a large color transparency looks more impressive than a smaller one and hence has a better chance of making the magazine.

Elisofon prefers the 5 x 7 Peco for color work, unless its weight and bulk make it unsuitable for the particular job; then he uses his 4 x 5 Linhof Technika. The 4 x 5 Deardorff is set up permanently in his own studio. When asked what he thought of each, Elisofon said that the Peco was rather heavy in the field and that the lighter 5 x 7 Sinar view camera might perhaps be preferable; apart from this he had nothing but praise for the Peco. In his

rather elderly Linhof he missed certain front adjustments which are incorporated in later models. The Deardorff he judged too lightly constructed for heavy-duty work and deficient in front adjustments.

For these cameras he has nine lenses: a 75mm Wide-angle Dagor, 90mm Wide-angle Angulon, 120mm Wide-angle Aristostigmat, 127mm Ektar, 150, 180, 210 and 240mm Schneider Symmars and a 400mm Tele-Megor. He uses one adjustable bellows-type Graphic lens shade. He carries 18 glass filters and some 60 different gelatins on all assignments. He uses one single filter adapter which fits all the lenses except the 400mm Tele-Megor. In addition, he owns a 4 x 5 Polaroid Land film holder and a set of neutral density filters for determining correct exposure for color shots. For black-and-white, he uses 4 x 5 film packs.

In future columns I'll interview other *Life* photographers, discussing their techniques and experiences with large cameras.—THE END

ULTRAMINIATURE

(Continued from page 54)

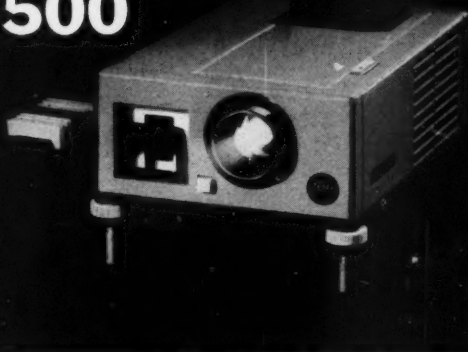
cial close-up stand similar to the Minox is available for the Mikroma camera, which also requires the use of close-up lenses.

Lighting for copying documents should be even, and the usual technique is to place a light on each side of the subject at equal distances. If you are photographing coins or other small objects with raised surfaces, you should have one light farther from the subject to create shadows and emphasize the design. Or, you may prefer to work with one light, using a reflector as a fill on the other side of the subject.

No exposure increase is necessary for close-ups with ultraminiatures, with or without close-up lenses, since the lens-to-film distance is never appreciably increased. Take exposure readings in the usual way with your meter, and expose exactly as recommended.—THE END



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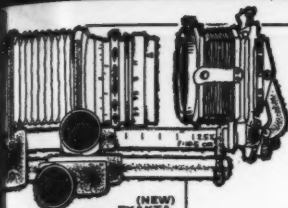
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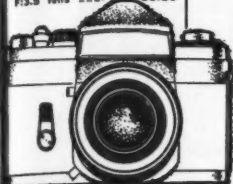
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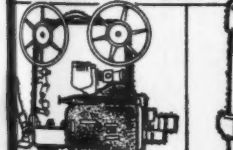
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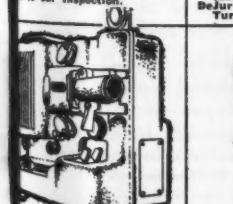
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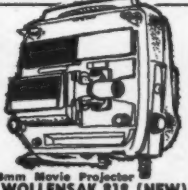
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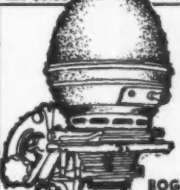
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TOO HOT TO HANDLE

I'm using a 50mm f/3.5 Elmar with my Leica. The definition with Kodacolor hasn't been good. Would I be wise to switch to an f/2 Summarit or an f/1.5 Summarit for better definition?—R. Saxner, Chicago, Ill.

Kodacolor is the problem. It is not capable of producing the images as sharp as those obtainable with black-and-white films of comparable speed. We covered the subject in Agfacolor Vs. Kodacolor in the November 1959 MODERN. However, about your lens—the 50mm f/3.5 Elmar is superior at most apertures to the f/2 Summarit and better than the f/1.5 Summarit.

I need a camera that will effectively show the detail of hand-forged wrought-iron work. Can the Mamiya C2 be used with good results as close as 7 in. from the subject? Would the Yashicamat or the Minolta Autocord equipped with Spiratone parallax correcting close-up attachments do as good a job?—C. L. Soule, Orcas, Wash.

The Mamiya C2 can certainly take close-ups from 7 in. between subject and camera. But there is a parallax problem. At that distance you cannot see the entire image in the viewfinder. When you use close-up attachments (which actually decrease effective lens focal length) with the Minolta Autocord or the Yashicamat there is a possibility of increased apparent perspective distortion when you move up close to equal the image size obtainable with the Mamiya C-2 and 80mm lens. We think that the quality of the Mamiya lenses is better than that of good twin-lens reflex lenses equipped with close-up attachments.

As an architect I must take pictures of buildings. Vertical lines must be rendered as vertical. I keep my Exakta VX-IIa level and as a result I have no control over sky or foreground. This could be controlled with the rising front of a view camera. But will the Kopil Folding Bellows-Mat with rising and falling front, tilt and swings do the same job?—J. F. Booton, Chicago, Ill.

We've examined that particular Kopil Folding Bellows-Mat unit and have found it to be well made. However, it can't take the place of a real view camera with tilts and swings. While a certain

limited control can be exercised with the Kopil unit, the difficulty lies in the camera itself. Light rays must enter the limited diameter lens mount, and if the lens on the end of the bellows is moved too far out of direct line with the film plane, the full image will not appear. We doubt that sufficient control could be exercised to make it worth your while to shoot buildings with the Kopil.

I own a Regula Werk King KG 35mm camera with 45mm f/2.8 Steinheil Cassar lens. I paid \$80 used when I originally bought the camera. Lately I've been offered \$40 for a trade-in—only a year and a half after the original purchase. Does this sound reasonable to you?—M. J. Robins, Ketchikan, Alaska. We feel that your original purchase price for the used Regula was far too high. However, the \$40 trade-in offer is more than reasonable, since it represents more than the actual trade-in value of the camera on today's market.

I am about to purchase an Edixa Reflex B. I'm not particularly interested in speed and am undecided whether to buy the camera with the f/2.8 Travenar, 50mm f/1.9 Ennalyt, or the 55mm f/1.9 Quinon. Which would you recommend?—T. W. Pearson, Richmond, Va. We strongly recommend the 55mm f/1.9 Quinon rather than the Travenar or the Ennalyt. We have just tested the Ennalyt and hope to publish the exact report soon. However, while it is good, it doesn't compare with the Quinon.

I am about to replace all of my filters since they are now somewhat outdated. Could you tell me if the Lifa filters are of high quality?—R. O. Heinemann, Beirut, Lebanon.

Lifa filters are mounted in beautifully made, superb-fitting bayonet rings. They offer speedy handling and compact storage since the filters can be bayoneted together in a stack.

Can you recommend a tele lens for my Leica IIIf for under \$50?—Hy Pisark, Brooklyn, N. Y.

You may be able to purchase a used 90mm f/4 Elmar in good shape for about \$50.

Results with my Contaflex IV and Aires Viscount have been quite satisfactory. But results with a Bushnell TeleVar mounted on either camera have been something less. Do you think I should switch to an interchangeable lens camera?—H. L. Bruns, Chicago, Ill.

While the Bushnell TeleVar will give satisfactory results when used on an interchangeable lens camera, our tests show it gives less pleasing results when used to supplement a regular camera lens. For sharpest results we'd recommend that you use a regular telephoto lens on an interchangeable lens camera.

How does my Ciroflex 2¼ x 2¼ twin-lens reflex compare with the 1½ x 1½ Komaflex S single-lens reflex?—Dr. J. Shapera, Rockville, Conn.

We don't think you'll find an appreciable difference between negatives shot with your Ciroflex and the Komaflex. However, the Komaflex does offer increased versatility for close-up work since it's a single-lens reflex. You can use close-up lenses over the lens and see precisely what the lens sees because of the through-lens reflex system of viewing and focusing. But for average photographic work we see little difference between the cameras.

Can you tell me if there are any moderate priced waist-level single-lens reflex 35mm cameras whose finders show precisely what will appear on the negative?—D. G. Henderson, Harrisburg, Pa. With the exception of just one single-lens reflex, the Nikon F, no single-lens reflex manufacturers guarantee that the image shown on the ground glass will be exactly that on the negative.

PUT IT IN WRITING!

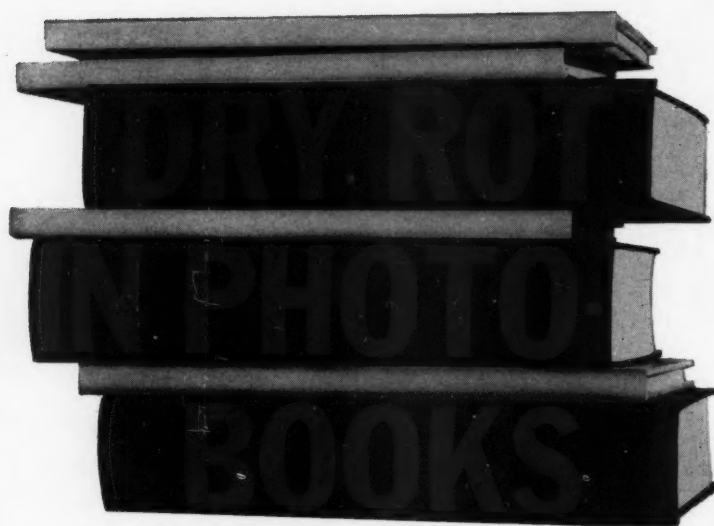
Your technical question, we mean. Even if it seems simple, we have to think and check before answering it—so if you phone us, all we can say is "Please write us a letter." Save your time and ours by writing to begin with.

Would the Biotar lens on my Exakta VX-IIa be suitable for enlarging up to 11 x 14?—W. Forman, Los Angeles, Calif.

We feel that the Biotar would be acceptable for enlarging, but a comparison between 11 x 14 prints made with it and a good enlarging lens would be recognizable. The fact remains that no matter how good a taking lens is, it's designed to record an image on a curved field, while a good enlarging lens is specifically designed to project a flat image.

I am considering the purchase of a used Tower 3 35mm camera with a 50mm f/2 Summar lens for \$55. Do you think it is a good buy? H. Crigler, Belmont, N. C.

We've had little experience with the
(Continued on page 122)



THE VAST NUMBER of inaccurate and useless photographic books in print is a crime and a disgrace. Many contain little useful information. Others are downright erroneous. And there has been no organization or law protecting the purchaser of photographic books, no agency that guarantees the validity of book purchases. For over ten years the editors of MODERN have reviewed books, good and bad. We have become increasingly disturbed and hereby declare an all-out-war on bad books—not picture books, which are mostly a matter of taste, but technical books, where facts are facts and nonsense is just that. However, we don't believe that a negative approach to this discouraging situation would be either appropriate or useful. So we will not list what we consider the worst books—even though we might enjoy doing it. Instead, to protect those of our readers who rely on obtaining instruction and information from photo books, MODERN hereby institutes a special selected listing of books read and found acceptable by its technicians. Since the task of re-examining books previously published and still available is enormous, a complete listing at this time is impossible. Here we publish our initial listing. Those interested in obtaining supplements as they are issued need only send us their names plus a stamped, self-addressed return envelope and we'll be happy to send the supplements free of charge.

Like MODERN's monthly review of new books, we promise that our book surveys will be free of fear or favor, no matter who the authors and publishers of the books might be.

Although we may not agree with all the facts and opinions within the books listed below, the technical staff of MODERN recommends them as good, basic texts.

Reference

Basic Photo Series, by Adams \$3.75 each. Five slim volumes containing a practical but complicated zone system of exposure and how to use it. For the advanced amateur.

Camera Techniques, by Walls \$4.50. Well-illustrated text on cameras, films, flash, all phases of picture making from technical viewpoint.

Cameras, the Facts, by Emanuel and Matheson \$3.50. Clear-cut drawings of all the world's cameras with dimensions and estimation of performance.

Focal Encyclopedia of Photography, \$20; desk edition \$6.95. Great reference book profusely illustrated. Get giant \$20 edition to impress your friends but cheaper one is just as complete.

Guide to Creative Photography, by Highland \$3.95. Profusely illustrated neophyte's book only limited by author's refusal to mention brand names.

Ilford Manual of Photography, by Harder \$8. It's not surprising that the emphasis is on Ilford but it's still a top reference book.

Miniature and Precision Cameras, by Lipinsky \$7.95. All innards of photo equipment explained and illustrated.

Photo Lab Index, \$19.95. All the specifics—films, developers, papers etc.—in great loose-leaf form. This plus the Focal Encyclopedia and you've got your reference library made.

Photographic Lens Manual and Directory, by Neblette \$.95. Excellent value in what might be called a condensed Cox's Optics. Research, however, is all Neblette's.

Photographic Optics, by Cox \$5.95. Profusely illustrated, easy-to-understand classic with diagrams, explanations of almost every popular lens in use today.

Photography and the Law, by Chernoff and Sarbin \$1.95. Model releases and other legal tangles explained and made easy. Essential stuff for the pro.

Photography: Its Materials and Processes, by Neblette \$10. CB's text remains standard technical classic.

Photojournalism: Pictures for Magazines and Newspapers, by Rothstein \$5.95. Heavily illustrated readable text used as basic book by would-be photojournalists.

Science of Photography, by Baines \$7.50. Relaxed, interesting writer leads reader deeper and deeper without drowning him.

Theory of Photographic Process, by Mees \$21.50. If you can't find the technical explanation here, it doesn't exist.

Editor's Note: All Kodak Dataguides, booklets, pamphlets are well researched and top values. There are hundreds. Consult your photo dealer for titles.

Exposure

Exposure, by Berg \$5. Highly detailed, exhaustive treatise on the little grains and everything that happens to them after they're hit by light.

Exposure Manual, by Dunn \$7.50. Less theory, more practical applications than Berg's book.

35mm Techniques

Keppler on the Eye-Level Reflex, \$4.95. Sassy, information-filled but opinionated guide to the breed.

Single-Lens Reflex Photography, by Cooper \$1.95. Cameras, equipment and how to use it clearly described.

35mm Negs & Prints, by Satow \$1.95. Excellent creative photographer and printer gives detailed information on films, developers, printing techniques.

35mm Photo Technique, by Newcombe \$4.50. Camera design, lens, film choice limits and capabilities explained exhaustively, precisely by master.

Color

Better Color Slides - Outdoors, by Bond \$1.95. Atrocious illustrations more than made up for by lucid, informative technical material.

Colour in Your Camera, by Skoglund \$6.95. Fascinating, heavily illustrated in color, technical book covering major puzzlers other writers have avoided.

Eye, Film and Camera in Color Photography, by Evans \$8.95. Psychological approach to photography neatly wedded to direct scientific fact by top expert.

Introduction to Color, by Evans \$10. Highly technical but absorbing classic on color theory.

Make Your Own Color Prints, by Bagby \$4.50. Clear directions on using most present-day materials and techniques.

Movies

American Cinematographer Manual, by Mascelli \$7.50. Serious 16mm movie makers will find basic charts, tables big help. Essential book for pros.

Better Electric Eye Movies, by Matzkin \$1.95. A confusing field neatly simplified in highly readable style.

Electric Eye Movies, by Current \$2.50. You can't tell the cameras without a good scorecard. This is it. Also full information on how to use them.

Picture Taking

Binoculars and Scopes and Their Uses in Photography, by the Reicherts \$1.95. Lifelong binocular experts write, illustrate fine book which is heavy in optics, lighter on photography.

Camera Afloat, by Newcombe \$5.95. Dull illustrations but top-notch text.

Filter Guide, by Rothschild and Wright \$1.95. Complete for both color, black-and-white work.

Getting Started in Photography, by Barry \$1.95. Good basic beginner's primer.

Lenses: How to Choose and Use Them, by Russell \$2.50. Leading magazine photographer gives an interesting personalized account on how to and how not to which is easy to use, understand.

Pictures in a Minute, by Wolbarst \$1.95. Extremely valuable, profusely illustrated volume by the expert in the field.

Press Photography, by Rhode and McCall \$6. Brilliantly conceived, well written and illustrated; essential text for newspaper and magazine photographers present and to be.

Say It with Your Camera, by Deschin \$4.95. Reprint of fine classic covering creative approach to photography.

Teenager's Guide to Photography, by Murphy \$1.95. Whole course on photography squeezed neatly into small easy-to-read package.

Underwater Photography, by Schenk and Kendall \$3.50. They know their picture taking stuff, but be wary of their methods of making underwater housings.

Underwater Photography Simplified, by Greenberg \$2. Well-illustrated tyro's introduction to the watery world.

Cameras

Argus 35mm Photography, by Murphy \$1.95. Author copes manfully with America's most popular line whose lineage stretches from today back to infinity.

Contaflex Manual, by Bombach \$7.95. Most complete guide written by expert.

The Contax Way, by Freytag \$4.95. The last word on the rangefinder Contax camera.

Linhof Practice, \$7.95. Swings, tilts and all that clearly explained for Linhof owners and all others with press and view cameras.

Official Miranda Manual, \$2.50
Official Nikon F Manual, \$2.50
Two practical, hard-bound, hard-headed guides to popular SLR's.

Pentax Guide, by Murphy \$1.95. Top-notch, easy-to-read guidebook.

The Retina Reflex Way, by Mannheim \$7.50. Extremely comprehensive encyclopedic treatment of whole Retina family and use.

The Rollei Way, by Mannheim \$4.95. Most complete book on Rolleiflex and Rolleicord going.

Editor's Note: It's senseless to list separately all the \$1.95 camera guides by W. D. Emanuel. All are technically superb and if there's one for your camera, don't hesitate.

Ultraminiature

The Minox Manual, by Cooper \$4.95. Leading ultra, leading user team up for top book on subject.

Ultraminiature Photography, by Cooper \$3.95. The complete how-to on cameras, shooting technique and processing.

Processing

Developing, by Jacobson \$4.50. Long on precise controls, techniques, explanations, short on latest packaged developers. Good reference.

Enlarging, by Jacobson \$4.50. Thorough treatise, well illustrated, on all phases from enlarger construction analyses to varnishing prints, but little information on modern sensitized materials.

(Continued on page 116)

If your well of experimental techniques is running dry, take a tip from S. C. Valastro and try toasting your slides like marshmallows for the effect on *page 74*. The number and the size of cracks, blisters, and bubbles depends on the duration and intensity of the exposure to the heat source, here an ordinary electric stove burner turned to medium high. Candles, matches, gas flame are not suitable, since their fumes coat the slide and darken it. Here are three points to keep in mind if you decide to toast your own transparencies: 1. The slide must be securely taped on all sides to a rigid metal frame, since when heat is applied it will shrivel, curl, and be bent out of shape completely before the emulsion begins to bubble. S. C. Valastro made a frame from a fly-swatter handle, bending the wire to form a rectangle and using ordinary adhesive tape to secure the slide. 2. Once the gelatin has formed bubbles, they cannot be removed. Keep a close watch, since the reaction, once it starts, takes place very rapidly. Make a few practice runs with worthless rejects before working with any slide which you actually want to keep. 3. Some color film emulsions turn an overall brownish red when heat is applied. Obviously, these films don't take to toasting. Valastro's method

TOP ONE SLIDE with another. A number of Valastro's combinations are assembled from existing transparencies. Here's how he chooses the slides which work together. He lays out a number of slides on a light box, separates verticals from horizontals, and scans each group separately for possible pairs. Here, he felt that the number 9, from the side of a steam locomotive tender, would add to the impact of black cat. Contax II, 50mm f/2 Sonnar lens, on Type A Kodachrome with Kodachrome Type A filter. Exposure for cat was 1/25 sec. at f/5.6; for number 9, 1/100 sec. at f/8.

**HOT
WAY
TO
REAL
COOL
COLOR**

for making the multiple images *opposite*, *page 75* and on the cover was to sandwich two transparencies in a single mount. Cat and Number 9 *opposite* were shot as single images, put together later as sandwich. Tree *page 75* and Elm and Quilt on the cover were planned and shot accordingly. Valastro's method for combining images when he works in this way is to first photograph the dominant image, i.e. the elm in the cover photograph. Then he projects this slide on a large sheet of paper, traces it, and makes the background sketch with dark pencil or crayon. He tries several versions of the background, compares them, and uses the best as a starting point for making the second slide. When making the picture of the quilt to combine with the elm, Valastro shot three versions at different camera-to-subject distances, tried each in combination before making final decision. Last step is to remove slides from processors' cardboard mounts, and mount them together in glass, using thin paper masks. To maintain a final mount thin enough to be used in all projectors, Valastro uses a transparent sealing tape instead of the cloth or heavy opaque tape usually employed. Note that all transparencies were shot on Kodachrome Type A with a Kodachrome Type A filter, the simplest method for taking pictures indoors by tungsten (without filter) and outdoors by daylight (with filter) on the same roll.—P.C.



TOAST A TRANSPARENCY on top of the stove. Valastro took one spring landscape made in a park, securely taped all four sides of the transparency to bent fly-swatter handle to prevent emulsion shrinkage, and held it over stove burner set on medium. Original Contax II exposure for landscape: 1/100 and f/5.6 on Kodachrome Type A with Type A filter with 50mm f/2 Sonnar lens; exposure to heat, less than one minute at approximately 3 in.

SANDWICH TWO VIEWS of a single tree. The exposure technique for making multiple images by sandwiching two transparencies is the reverse of that for double exposure on a single unit of film. If you want to make a double exposure in black-and-white with the images of equal density, you should give half the correct exposure (underexpose each image by one f-number). If you plan to sandwich two transparencies, the exposure for each should be four to eight times that correct for the situation, or each picture should be overexposed by two or three f-numbers. Contax II camera, 50mm f/2 Sonnar, Type A Kodachrome, Type A filter, 1/100, f/8 for each shot.





MODERN'S BABIES



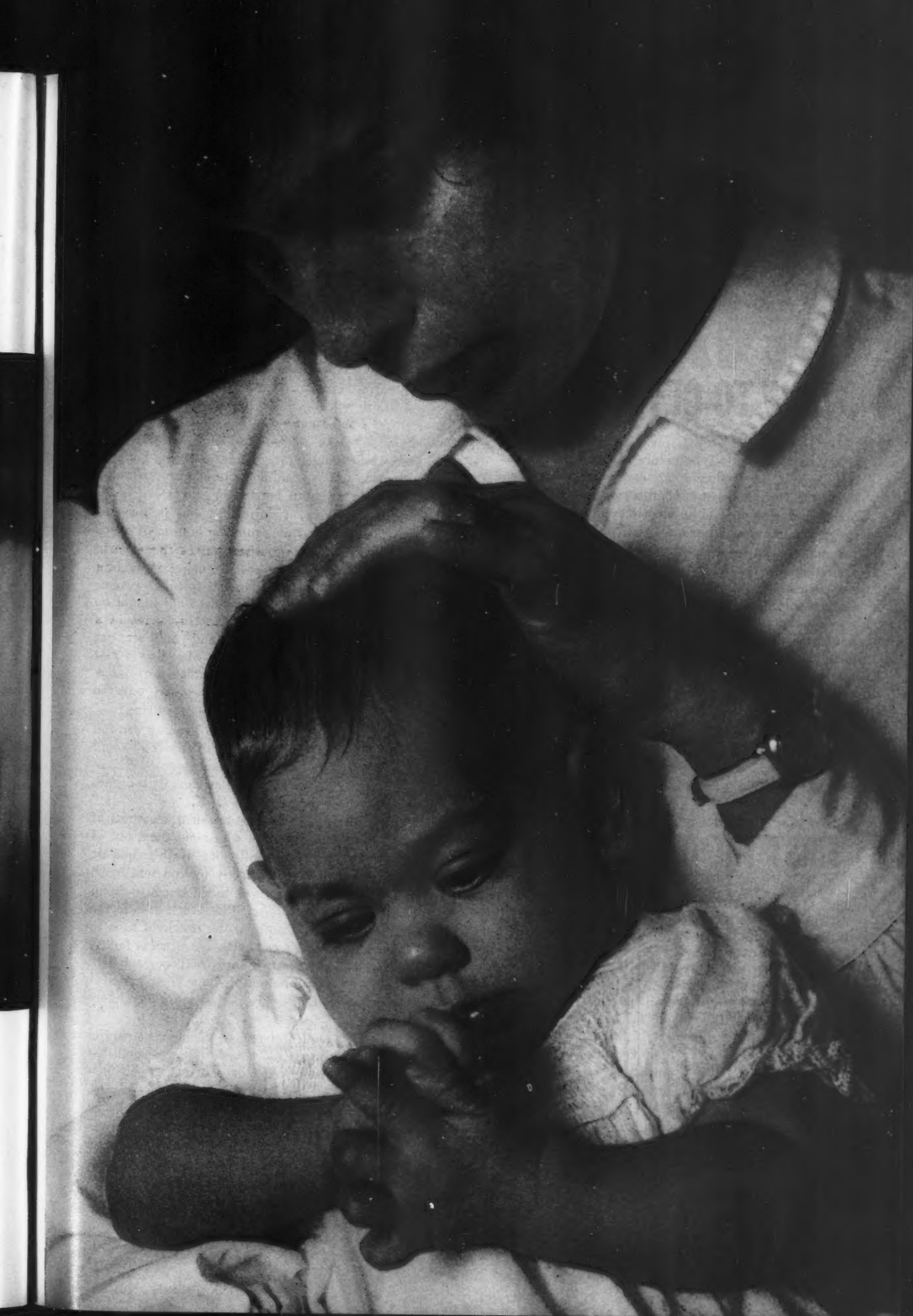
Who cares about baby pictures? Everybody does, of course—but especially people with babies. MODERN's editors are no exception, and within the last few years we've amassed a collective family album of impressive proportions. Here are three shots from it—accompanied by the story of how the photographer-parents took them.

TIGHT FRAMING produced best version of Herbert Keppler's wife and child playing on the front lawn. Keppler quickly clicked off a roll of 35mm Plus-X Pan in a Miranda D with 135mm f/3.5 Schneider Tele Xenar shooting at 1/125 sec. and f/16, developed the roll on the spot in Unibath CC-1. Keppler used the changing bag which comes with the Senior Unibath Kit to load film into Unitank, poured in the processing solution, was able to view fixed film about 6 min. after shooting.

ANTICIPATING REACTION of 8-month-old son to being placed in stroller prior to daily walk, William Johnson had Heiland Pentax H-2 loaded with Tri-X Pan and 55mm f/2 Takumar lens set at f/2 and 1/60 second, the exposure which he knew from experience would be correct for living-room daylight. Before his wife placed the child in the stroller, Johnson also set focus at about 2 ft., was completely prepared to pounce in and shoot fast. Total: about six frames, here the one with the broadest grin. Wide aperture kept zone of sharp focus very narrow, reduced distraction of busy background. Note that back of stroller, just a few inches behind baby, is completely out.



SPLIT-SECOND TIMING captured coincidental similarity between mother's and child's expressions. While Edward Meyers' wife was smoothing her daughter's hair, the child waved her arms about and her attention wandered around the room. For an instant she clasped her hands and examined them; Meyers shot at 1/30 and f/2 on Super Hypan rated at E.I. 400 with a Leica M2 and 50mm f/2 Summicron lens. Soft, directional light is from a Noguchi lamp, which has a regular 100-watt tungsten bulb surrounded by an almost tissue-thin white paper shade. Available light reading made with Gossen Lunasix meter.



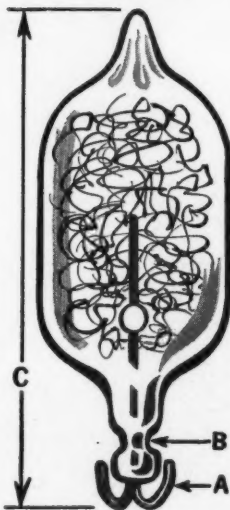
AG-1 SNAFU & HOW TO GET OUT OF IT

JELLY-BEAN SIZE AG-1 bulbs are virtually weightless, and capable of producing an enormous quantity of light. A 13-oz. carton of 144 bulbs can be carried without an undue amount of bulging in a coat pocket. They are, in short, a real boon to flash photography. Unfortunately they suffer from one characteristic entirely excusable in jelly beans but not so in flashbulbs. They're not perfectly uniform. Analysis of a great number of General Electric, Sylvania, and Westinghouse AG-1's revealed that not only do they vary in length and width, but it was virtually impossible to find two bulbs exactly alike in all dimensions. This in itself would be no cause for concern if the bulbs behaved themselves 100 percent of the time. But they don't. And the reason is, precisely, that lack of uniformity.

Unlike the blown-to-shape metal-base M2 bulbs, which produce the same effective amount of light, the 1¼-in. high, ½-in. wide (approximately) AG-1 is made from straight glass tubing (AG is the abbrevia-

FIRST THE BULB PROBLEM

Like jelly beans, AG-1 bulbs vary in size and shape. With present bulbs, manufactured by General Electric, Sylvania, Westinghouse, problems can often exist in these areas: (A) Copper contact wires—if bent even slightly out of shape, they may cause misfire due to improper contact. (B) The base groove—if too thick, it may stick in magazine of gravity-fed repeating gun or fit poorly in single-shot. (C) Variation in length limits the number of different precision repeating guns which can be made.



tion of "all glass"). It's largely because they do not have a metal base (which is easy to mass-produce within close tolerances) that AG-1's have the imperfections noted above. However, they need not be physically perfect. If they were, you'd probably be paying one dollar for each bulb instead of about ten cents. Overall measurements (height and width) of the bulb usually do not cause any great problems. (However, it does place limitations on the manufacture of repeating guns, since in most cases the bulbs must fit perfectly in magazine or compartments or they'd be apt to cause jamming.) But there *are* serious problems at the base of the bulb. It's more than likely that at one time or another you've come across a few AG-1 bulbs which wouldn't fit your flashgun. Or if you were able to get them in, they'd fall right out.

AG-1's are held by a groove which is part of their glass base. Unfortunately, the groove on some bulbs is thicker than on others. And some thick-grooved bulbs may fit in some flashguns but not in others.

The second problem of uniformity lies in the two naked wires which protrude from the bottom of every AG-1 bulb. Through these wires passes the electric current which ignites the light-producing zirconium filament inside the bulb. If they fail to make proper electrical contact with the flashgun, the bulb cannot be fired. Have you ever examined these tiny wires in a dozen different AG-1 bulbs? Try it, and you'll see that not many appear exactly alike. You may find a few bent slightly out of shape. You may also find a few completely mashed. It's the bent contact wire, not the bulb itself, that's the cause of most AG-1 misfiring.

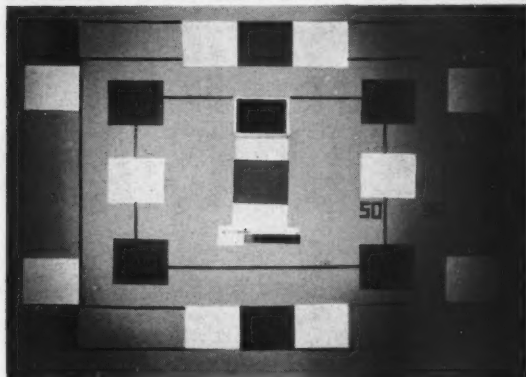
How do you know when the glass grooves are too thick? And how can you be sure that your bulbs will fire? You simply have to check every groove by actually inserting the bulb into your flashgun. If the bulb seats securely, then the groove is O. K.

Contact wires present another problem. But first of all, make sure that it isn't you who bend them out of shape. Slide the bulbs carefully out of their plastic tubes. Don't pull them out directly or you will mash the wires. Now it's time to check them. Use a flashgun which has a built-in bulb tester. Place each bulb in the gun and push the test button. If the test light fails to light and you're using a fresh battery, contact is faulty. Bend the contact wires back into their normal "U" shape, if they appear to be out of shape. Test again. If you still don't get contact, your bulb is more than likely to be a dud.

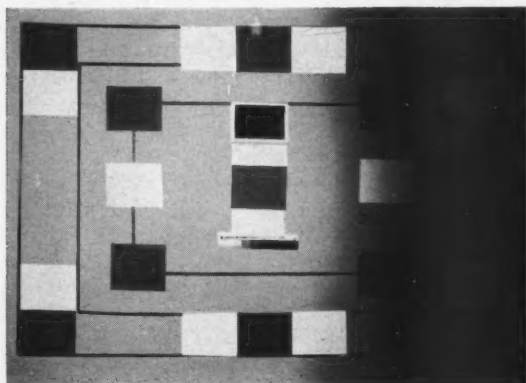
Don't blame all your problems on the bulbs. A careful check of currently made AG-1 flash units revealed that many produce inferior reflector coverage. Some distribute light over large areas, others over small areas. A few produce off-center distribution. And virtually all give uneven coverage.

An acceptable flashgun produces light where you want it. If you've ever wondered why your flash shots appeared darker in one corner, dark in all corners, or lighter in some areas, then it's time for you to take a critical look at your flash reflector.

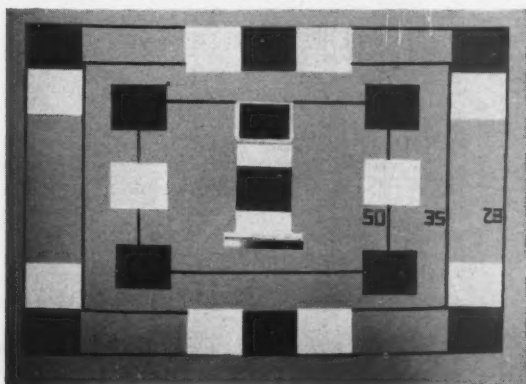
THEN REFLECTOR PROBLEMS



Many are just adequate. In results with adequate AG-1 unit for 50mm lens on 35mm camera, light falls off beyond 50mm marks—more on right—showing limited coverage, reflector misalignment.



Others may be good but need adjustment. Ever find your flash unit fit loosely in the accessory shoe? Above is possible result: useful light falls out of view since reflector was aimed off-center.



And some offer excellent coverage. Highly efficient AG-1 flash units distribute light evenly beyond 28mm lens angle of view. How do you test your flashgun for efficiency? See text.

Here's how to make a simple reflector test. Load your camera with a medium-speed black-and-white film such as Plus-X Pan. Place the camera on a tripod and position it perpendicular to a medium-tone wall 10 ft. away. Use the shortest focal-length lens with which you intend to shoot flash. Attach the flashgun as you normally do—in the camera accessory shoe or on a bracket. With a leaf-shutter camera, set camera sync on "X" and shutter at 1/30 sec.; with focal-plane, just set at "X." Make three flash shots of the wall—one at f/8, f/11, and f/16. If you wish, attach a few gray and white cards to the wall as we did to simplify evaluation. As long as your lens does not produce violent light fall-off at the edges—and for your sake we hope at f/8, f/11 and f/16 it does not—here's what you should look for in each exposure.

Does density seem uniform over the central portion of the negative but violently thin at the edges? If so, your reflector is not distributing light well enough. Note that some folding fan-type reflectors can be adjusted for different coverage. Check yours if it's adjustable—it may be in the wrong position.

Is just one corner of the negative thinner in density? Check your flashgun. It may fit loosely in the camera accessory shoe and be positioned off-center. Or perhaps your reflector is incorrectly mounted on the gun.

Can you see small dense areas within the negatives? These are probably "hot spots" caused by a poorly designed, poorly constructed or damaged reflector. Virtually all flashgun reflectors produce some degree of hot spots, but with some they're impossible to detect.

In spite of everything, they're good!

Don't let us sour you on AG-1. We use them all the time, and despite the few discouraging notes, we're convinced that these tiny bulbs are on the whole excellent sources of light.

Incidentally, one advantage of AG-1's with leaf-shutter cameras is that you don't need extra flashguns if you'd like more light on the subject. The AG-1 bulbs can be fired sympathetically. That means if one bulb is fired by an electrical current (from the flashgun), any other AG-1's touching that bulb will be ignited by the heat. So if you want more light, simply attach a few more bulbs with transparent tape. When attempting this, use a relatively slow shutter speed such as 1/30 sec. to get most of the light, since sympathetic firing is not instantaneous. The AG-1 illustration on this month's cover was made just this way. By photographing the bulbs at a fast shutter speed, Myles Adler was able to show the sympathetic firing action.

AG-1's are as heartening a photographic innovation as was the first transistorized electronic flashgun. Both led to smaller, compact flash units. Indeed, it's more heartening than what seems to be a trend of camera manufacturers to make larger heavier machines from what used to be small pocketable cameras. Why, now you need the small flashguns and bulbs as a counter-balance!—E.M.

Technical Research and assistance by Myles Adler.

FAST FILM INDOORS AND...

BEWITCHED, bothered and bewildered by expert advice on choosing the precise film, precise exposure technique, precise exposure index, precise camera for the precise picture? Especially when all you want to do is take pictures of a pretty girl, but. . . .

And thereby hangs the problem, for you've got the pretty girl and you've got a 35mm camera, but you want to take pictures in the daytime and at night; you want to take pictures in a restaurant by window light, in broad daylight walking down the street, and want to throw in a tricky shot by candlelight. How many films do you need? How many developers, how many indexes?

In short, what to do?

We suggest you take a good look at Thomas Hopker's pictures on these four pages and if you like them as much as we do, you follow his thread through the labyrinth.

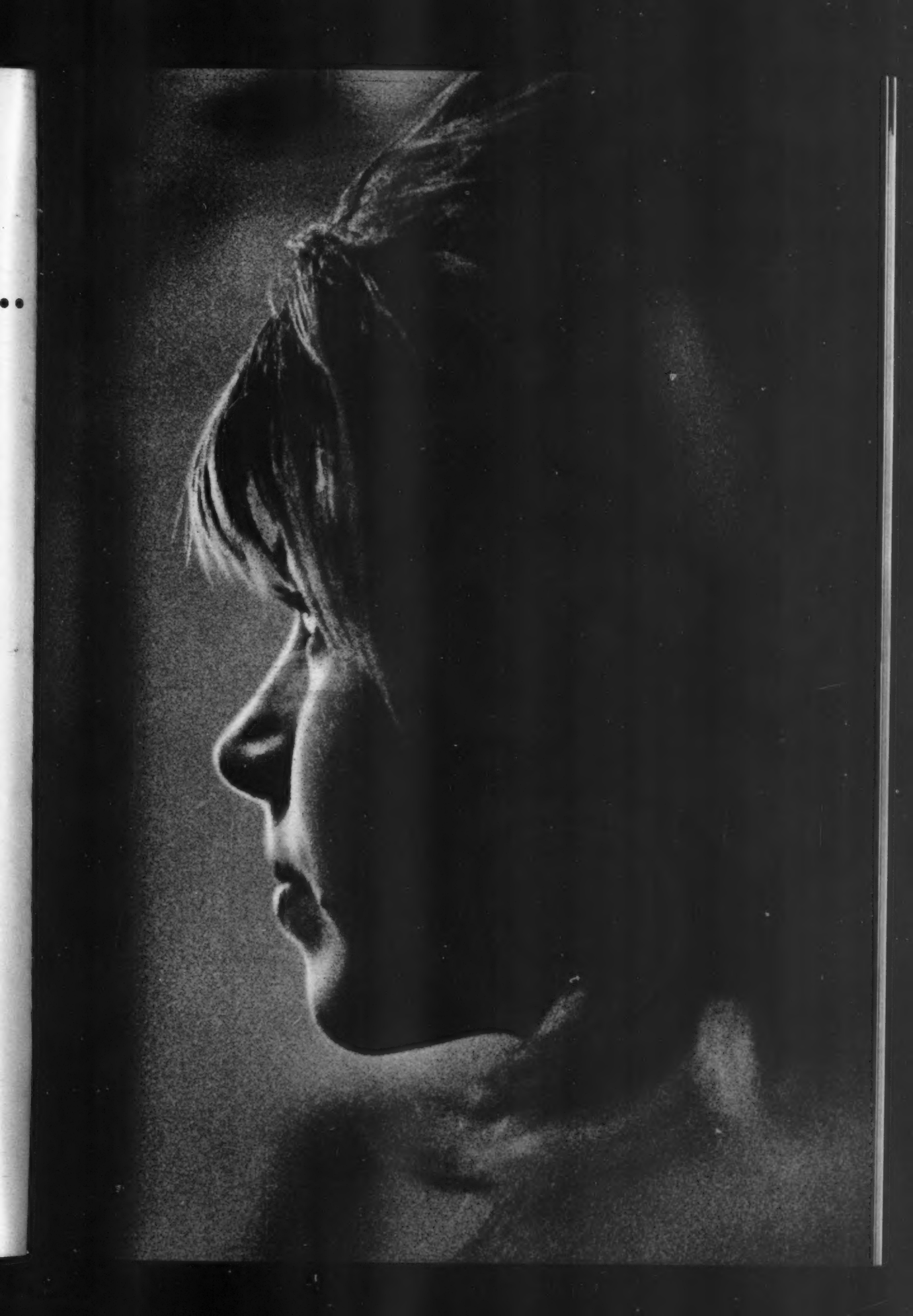
First of all we leave his choice of the models to the last of all. Second, we assume you've got the 35mm camera and a lens or two. (Hopker used two, could actually have gotten away with one.) He used one film—the old Tri-X, rated it at one speed, E.I. 650. This rating was high enough to cope with all the lighting conditions he (or you) would face; it was not so high as to cause either excessive graininess or, in most cases, loss of needed shadow detail. We say "needed" because in the candlelight picture (*top left*) you would

CANDLELIGHT (*top left*) provides single bright spot of illumination for pixie portrait. Hopker set 50mm f/2 Summicron at widest aperture, shot at 1/30 sec.

WINDOWLIGHT (*left*) in cafe at high noon was fairly even. Photographer eschewed 50mm, chose 90mm f/2 Summicron lens which avoided apparent perspective distortion of hand; f/2, 1/60 second.

BACKLIGHT (*right*) from bright stage illumination spills onto left cheek of girl standing in wings. Graininess is more apparent in this backlit picture than in the evenly lit photo (*left*), even though both pictures were taken on same film, rated and developed in same manner. Note: All pictures on these and the next two pages were taken with a Leica M2 on old Tri-X, rated at E.I. 650.







...FAST FILM OUTDOORS, TOO!

neither need nor expect to obtain shadow detail.

Hopker developed all his film in Promicrol by time and temperature—8 minutes at 68F for all but the candlelight (*page 82*) and backlight (*page 83*) shots, when he pushed the developing time gently to 10 minutes.

Obviously the old Tri-X is beside the point for your problems; we suggest you might try Ilford HPS, rate it at E.I. 800, develop in Microphen 13 minutes at 68F.

We also suggest you try using an exposure meter as Hopker did not; he has the benefit of much and daily experience in this kind of shooting. We saw the results of his experience in the contact sheets from which we chose these pictures, and there are no exposure disasters. But just because the high wire man can walk a thin line several hundred feet above you in the air, we wouldn't recommend that you do it.

If you're using one film at one rating in many light levels, at least take a general reading for each different situation; then open up or stop down as the subject moves nearer or farther from the light source.

Now a word about these models. Hopker used movie actress Macha Meril for *pages 84, 85, lower left page 82*; and student actress Dany Muller in picture on *page 83, top left page 82*. You'd better stick to your best girl.—J.B.

FRONT LIGHT (left) effect is achieved by placing girl in shadowed doorway which provides dark frame for blonde hair. Fast film permitted exposure of 1/250 sec. at f/8; fast shutter speed meant model could toss head, move from side to side at will. Taken with 50mm f/2 Summicron.

SIDE LIGHT (upper right) fills glass-walled telephone booth fairly evenly. Photographer using same exposure as above had comfortable zone of sharp focus within which to work, didn't have to constantly check focus, could concentrate on capturing action.

TOP LIGHT (right) from overcast winter day is just the ticket when you want detail in your model's eyes. Exaggerated, charming pose of tilted head is result of photographer's concentration on direction of model's pose, possible with f/8, 1/250 sec.



MODERN'S GUIDE TO COLOR FILM FILTERS

HAVING FILTER FRUSTRATION? THIS CHART WILL HELP YOU TO USE ALMOST ANY 35MM FILM IN ALMOST ANY KIND OF LIGHT.

WHAT do you do if a color film doesn't match the lighting condition? The answer, you might say, is simple—use a filter. However, the number of filters for each of the 16 types of film is staggering. But which one should you use and when should you use it? Sympathizing with the photographer's filter frustration, Norman Rothschild has concocted this chart listing the filter to be used with each type of film in varying lighting situations. New this year are the listings for Kodachrome II.

The filters listed for use with fluorescent lighting are all of the Color Compensating type (CC has been omitted to save space). Elsewhere, the filters are numbered according to the Wratten system. The 1A filter is also known as Skylight or Chrome Haze. UV filters are similar.

The exposure indexes recommended with electronic flash are for use with the guide number method of exposure calculation. Numbers under clear flashbulbs used in the appropriate reflector are approximate guide numbers for No. 5, 25, M5, and M25 lamps; under blue flashbulbs for No. 5B, 25B, M5B and M25B lamps, and under SM and SF for these lamps.

High Speed Ektachrome is not recommended with photofloods and studio floods, but the following filters and exposure indexes may be tried: Photofloods: 78A, E.I. 32; Studio floods: 78A + 82A, E.I. 20.

Because fluorescent lighting does not have a true color temperature, readings with a color temperature meter are unreliable. Though labeled similarly, lamps of different makes differ in color quality, which also varies with the age of the lamp.

LIGHT \blacktriangleright	FILM \blacktriangledown	DAYLIGHT TYPE														
			Fluorescents		Amber Flash (Dura, Solar—3200K)		Studio Floods (3200K)		SM, SF Flash (3300K)		Photofloods (3400K)		Clear Wire-Filled Flash (3800K)		Blue Flashbulbs	
			Cool White	10B+30C	16	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
			Warm White	20B+30C	16	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
			White	20B+20C	16	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
			Daylight	10B	25	20R	20	20R	100	20R	6	20R	16	N.R.	N.R.	N.R.
			Amber Flash (Dura, Solar—3200K)	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
			Studio Floods (3200K)	80B+82A	8	80B+82A	8	78A+82A	20	80B+82A	3	80B+82A	8			
			SM, SF Flash (3300K)	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
			Photofloods (3400K)	80B	12	80B	12	78A	32	80B	5	80B	12			
			Clear Wire-Filled Flash (3800K)	80C	95*	80C	80*	80C	200*	80C	50*	80C	80*			
			Blue Flashbulbs	None	95*	None	80*	None	200*	None	50*	None	80*			
			Electronic Flash	81A	32	None	32	None	160	None	10	None	25			
			Late P.M. or Early A.M. Sunlight—Reddish	82A	25	82A	25	82A	125	82A	8	82A	20			
			Open Shade, Marine, Cloudy, Distant Scenes	1A	32	1A	32	1A	160	1A	10	1A	25			
			Sunlight plus Sky-light—Average	None	32	None	32	None	160	None	10	None	25			
			Filter	E.I.	Filter	E.I.	Filter	E.I.	Filter	E.I.	Filter	E.I.	Filter	E.I.	Filter	E.I.
			ANSCOCHROME													
			EKTACHROME E-2													
			HIGH SPEED EKTACHROME													
			KODACHROME													
			KODACHROME II													

KODACHROME II		E.I.	25	25	20	25	80*	12	N.R.	8	N.R.	16	N.R.	N.R.	N.R.
SUPER ANSCOCHROME	Filter	None	1A	82A	81A	None	80C	80B	N.R.	80B+ 82A	N.R.	10B	20B+ 20C	20B+ 30C	10B+ 30C
	E.I.	100	100	80	100	170*	170*	40	N.R.	25	N.R.	80	50	50	50
TYPE F															
EKTACHROME	Filter	85C	85C	85C	N.R.	N.R.	None	82A	82B	82C	N.R.	N.R.	20M+ 10Y	20M+ 10Y	30M+ 20Y
	E.I.	16	16	16	N.R.	N.R.	120*	16	50*	12	N.R.	N.R.	16	16	12
KODACHROME	Filter	85C	85C	85C	N.R.	N.R.	None	82A	82B	82C	N.R.	N.R.	20M+ 10Y	20M+ 10Y	30M+ 20Y
	E.I.	10	10	10	N.R.	N.R.	95*	12	40*	10	N.R.	N.R.	10	10	8
TYPE A															
ANSOCHROME TUNGSTEN (3400K) TYPE 532	Filter	85	85	85	N.R.	N.R.	81C	None	N.R.	82A	None	50R+ 50Y	20R+ 20Y	10R+ 20Y	40R+ 30Y
	E.I.	25	25	25	N.R.	N.R.	110*	32	N.R.	25	132*	12	16	16	12
KODACHROME PROFESSIONAL TYPE A	Filter	85	85	85	N.R.	N.R.	81C	None	None	82A	None	N.R.	30M+ 10Y	30M+ 10Y	30M+ 40Y
	E.I.	10	10	10	N.R.	N.R.	80*	16	50*	12	85*	N.R.	8	8	6
KODACHROME II TYPE A	Filter	85	85	85	N.R.	N.R.	81C	None	None	82A	None	N.R.	30M+ 10Y	30M+ 10Y	30M+ 40Y
	E.I.	25	25	25	N.R.	N.R.	150	40	90	32	150	N.R.	20	20	20
TYPE B															
HIGH SPEED EKTACHROME TYPE B	Filter	85B	85B	85B	85B	85B	81C	81A	81A	None	None	85B+ 30R	20R	20R	40M+ 50Y
	E.I.	80	80	80	80	80	240*	100	120*	125	270*	64	80	80	40
SUPER ANSCOCHROME TYPE B	Filter	85B	85B	85B	N.R.	N.R.	81D	81A	N.R.	None	None	50R+ 50Y	20R+ 20Y	10R+ 20Y	40R+ 30Y
	E.I.	80	80	80	N.R.	N.R.	220*	100	N.R.	100	230*	40	50	50	40
NEGATIVE															
AGFACOLOR CN14	Filter	None	1A	82A	85	N.R.	None	82A	N.R.	82C	N.R.	N.R.	20M+ 10Y	20M+ 10Y	30M+ 20Y
	E.I.	20	20	16	8	N.R.	90*	16	N.R.	12	N.R.	N.R.	10	10	8
AGFACOLOR CN17	Filter	None	1A	82A	85	N.R.	None	82A	82B	82C	N.R.	N.R.	20M+ 10Y	20M+ 10Y	20M+ 10Y
	E.I.	40	40	32	16	N.R.	140*	32	55*	20	N.R.	N.R.	20	20	16
KODACOLOR	Filter	None	1A	82A	85	N.R.	None	82A	82B	82C	N.R.	N.R.	20M+ 10Y	20M+ 10Y	30M+ 20Y
	E.I.	32	32	25	12	N.R.	120*	20	50*	16	N.R.	N.R.	16	16	12

N.R.—Not recommended with this light

*Guide #5 flashbulb in 5" polished reflector

MONTHLY CONTEST

Press the release and raise a smile

HUMOR IN PHOTOGRAPHY is a delicate thing: try too hard to grasp it and it will probably collapse. And there's the added handicap that a picture which makes you smile may leave most other people cold. But the humorous picture is always well worth trying for, if only because it's a rarity: even the picture that raises just a quiet smile comes along with surprising infrequency. There's no simple recipe for making a smile or laugh picture. Some people say that you can't set up a good humorous picture, or if you do set it up, it should look accidental. But two of the pictures here (*top this page and top opposite page*) obviously were set up and don't suffer in the slightest. One reason may be that both pictures were kept simple, with plain, undistracting backgrounds—but this is also a good recommendation for many types of pictures. Of the other two, one (*bottom this page*) depended on the photographer having his camera in the right place at the right time, while the other (*bottom opposite page*) depended on the right viewpoint.

You may enter any number of black-and-white prints in the "Monthly Contest." Pictures must be unmounted, 4 x 5 or larger. Polaroid prints may be original size. Your name, address and all technical data must appear on the back of each print. No entry blanks are needed. Unused photos will be returned *only if you enclose a stamped (first-class postage) addressed envelope*. Entries to Columns Editor, MODERN PHOTOGRAPHY, 33 W. 60 St., New York 23, N. Y.

SYMMETRICAL COMPOSITION (*top right*) helps to stress incongruity of uses for plastic nose cones for rockets. David S. Strickler, Lebanon, Pa., used a Rolleiflex with Verichrome Pan film, shot by window light with an exposure of f/3.5 and 1/60 second.

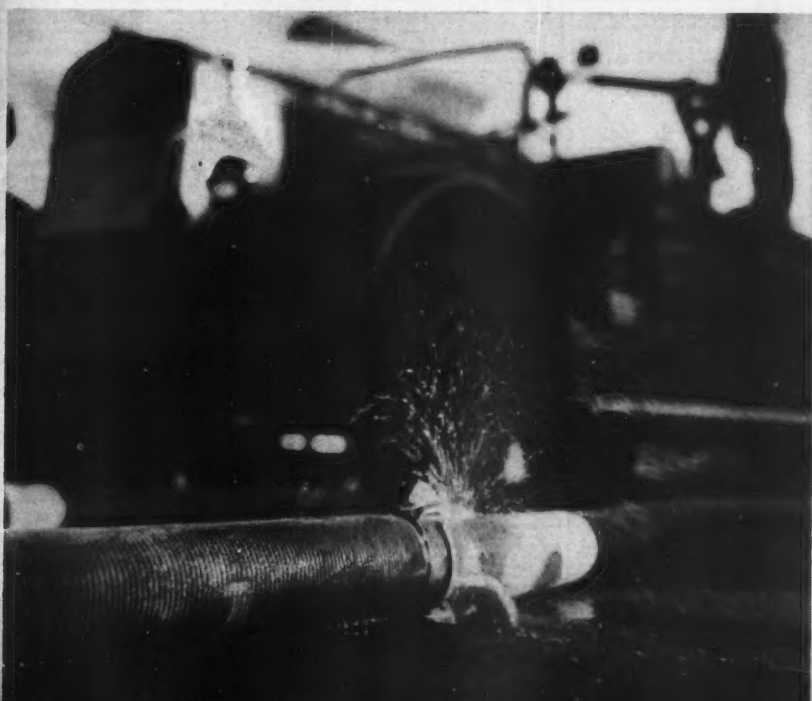
FRAMING of empty station adds to impact of these > "commuting" pigeons that are apparently waiting for a train. Art Zeller, New York City, used a Rolleiflex with Verichrome Pan film, exposed at f/11 and 1/125 sec.





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LOW-KEY LIGHTING, which picks out only the faces, hands and metal parts, adds a touch of whimsy to this double portrait of woodwind enthusiasts. Gunther A. Dertz, San Francisco, Calif., used an Iko-flex with 75mm Tessar, exposed at f/8 and 1/50 sec. on Plus-X Pan.



SELECTIVE FOCUS, which concentrates on spray from hose connection, makes wry contrast with blurred, efficient-looking truck in background. John M. Anderson, Minneapolis, Minn., used a Kalloflex, exposed at f/11 and 1/5 second on Agfa Isopan F film.

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Copying Lights	1.50	1.50
Negative Carriers all sizes to 2 1/4x3 1/4	1.25	1.25
Copy Arm	1.75	1.75
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Canonflex w/f:1.8 Lens, Meter & Case	325.00
Zeiss Contarex f:2 (Used)	99.50
Zeiss Contax IIA f:2.8 (Used)	129.50
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Voigtlander Vitasomatic f:2.8	129.00

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Rolleiflex f:3.5 (Used)	149.50
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Polaroid 466 Camera Kit (Used)	149.50
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CASE & FLASH ADD \$16.95 (SOLD WITH CASE ONLY)

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Sub-Minature (Latest Model) f:3.8 Lens, focuses from 8" to infinity, speeds from 1/2 to 1/1000 second, Built in exposure meter in A.S.A.

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Large 2 1/4x3 1/4" viewing area. Optical glass prism shutter. 400-foot rewinds. Focusing control. Includes dry splicer tape.

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4 x 5 CROWN GRAPHIC (Latest Model)

Acclaimed by Newspapers, Professionals and Amateurs, Alike!

Includes Crown Graphic 45 with Graphic Rangefinder, Graflex Flash Bracket and 135mm Schneider Xenar f:4.7 Lens with flash Synchro Compur Shutter; Graflex Back has Xaltalite Field Lens.

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OFFICIAL DEPTH- OF-FIELD TABLES

FOR 35MM CAMERAS - FROM 21MM TO 1000MM

For the first time MODERN PHOTOGRAPHY presents a completely matched and integrated set of tables for your general and critical photographic work.

WHY YOU NEED THESE TABLES

The variety of depth-of-field tables engraved on lenses and on cameras, published by lens and camera manufacturers and appearing in countless guides and data sheets vary greatly in consistency and reliability. Many are hopelessly imprecise. Different formulas and standards are often applied to lenses of like focal length. We decided that a complete, comprehensive set of depth-of-field tables was needed for 35mm photography, applying the same rigid standards to all focal lengths from 21 to 1000mm. Actually, two sets of tables were necessary: one for the photographer who seldom makes a print larger than 11 x 14, or who projects his color transparencies only in his living room, and the other for the man whose pictures may stand mural-size enlargements or whose color shots may appear full-page in a finely printed magazine. Because of space limitations only the most popular focal lengths and apertures have been listed. However, an exhaustive depth-of-field table compilation of 29 focal lengths with 23 apertures at 14 different distant settings will shortly be available in book form. If you're interested, write in care of this publication.

HOW THEY WERE COMPUTED

Sharpness depends not only on the physical sharpness of the image itself but on the distance from which you view it as well. Up till now the "proper" viewing distance has been determined by multiplying the focal length of the camera lens used to take the picture (in inches) by the number of times the full negative is enlarged in printing or projection. For example: if you take a picture with a 50mm (2-in.) focal-length lens and enlarge the negative 10 times to fill a full 10 x 14-in. print, the "proper" distance for viewing and for determining picture sharpness would be 2 x 10 or 20 in.—about an arm's length in front of you. But who holds a print at arm's length? Isn't 12 in. a much more realistic viewing distance? However, the closer you come, the less sharp the picture becomes. And here's another point. If, instead of making a full negative enlargement, you blow up a small section of the 35mm format only to an 8 x 10 print, and you apply the so-called viewing rule of focal-length times magnification, you may end up viewing the print from 5 ft. away. Obviously, people rarely view a picture from the "proper" distance. A newer, more useful guide is needed. By tightening up the

depth-of-field tables to give us a sharper image at a close viewing distance we could accomplish just this. Here's how we did it.

Subjects are actually made up of tiny points of light varying in tone. The lens transmits these points and deposits them on film. In theory, when the lens is focused on a specific subject plane, all points of the subject on that plane should be correspondingly sharp on the film. Out-of-focus points in front of and behind this plane gradually become blobs of light rather than points. If these blobs are too small to be distinguished from the perfectly sharp points, the blobs are considered to be within the zone of sharpness (depth of field). Once the blobs are large enough to be distinguished, they are considered unsharp or out of the zone. But at what point scientifically can the blobs be said to be too large? Lens and camera manufacturers use the so-called "proper" viewing distance, which gives an allowable blob on the negative of about 1/20 to 1/30mm. (This limit is called the "circle of confusion.") After much research and testing, as well as consultation with optical experts, we feel that blobs (circles of confusion) of 1/40mm and 1/50mm are more applicable to modern films and lenses and the closer viewing distance. The 1/40mm tables are sufficiently precise for general photographic work. For the most critical amateur and professional the 1/50mm circle is preferable.

How did we compute a full set of tables by using these circles of confusion? They were not computed by picking numbers out of a hat. Technical consultant Bennett Sherman supplied us with the following formulas. Computer Applications, Inc. in New York used an IBM 7090 electronic computer to make all the computations. Here's what was fed into the computer:

$$X_n = A \left(1 + \frac{A}{B+K} \right)$$

$$X_s = A \left(1 + \frac{A}{B-K} \right)$$

$$B = \frac{A^2}{D-A}$$

$$K = EM$$

$$X_n = \text{Near distance}$$

$$X_s = \text{Far distance}$$

B=Nominal lens focus distance beyond infinity focus point

K=1/2 depth of focus

A=Lens focal length

D=Nominal subject distance from lens

E=f-number

M=Circle of confusion

HOW TO USE THEM

To use the Official Depth-of-Field tables, first locate the page with the focal length of your lens. Then, using either the general table for average photographic work or the critical for more precise work, locate your aperture and camera-to-subject distance. The table will give you the nearest and farthest distances between which a subject can be considered adequately sharp.

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.6"	2'10.4"	4' 7.6"	6' 3.5"	8' 7.3"	12' 0.7"	15' 1"	27' 6.1"	60'11.9"
	FAR	1' 6.4"	3' 1.8"	5' 5.2"	7'10.7"	11'11.2"	19'10.2"	29' 8.3"	276'10.5"	∞
f/1.2	NEAR	1' 5.5"	2'10"	4' 6.5"	6' 1.6"	8' 3.7"	11' 5.6"	14' 2.1"	24' 7.2"	48' 3.6"
	FAR	1' 6.5"	3' 2.3"	5' 6.7"	8' 2"	12' 6.9"	21' 8.3"	34' 0.5"	∞	∞
f/1.4	NEAR	1' 5.4"	2' 9.7"	4' 5.7"	6' 0.1"	8' 0.9"	11' 0.5"	13' 6.2"	22' 8.2"	41' 4.9"
	FAR	1' 6.6"	3' 2.7"	5' 8"	8' 4.8"	13' 1.7"	23' 5.3"	38' 6.7"	∞	∞
f/1.5	NEAR	1' 5.4"	2' 9.5"	4' 5.3"	5'11.3"	7'11.6"	10'10"	13' 2.5"	21'10"	38' 7.8"
	FAR	1' 6.7"	3' 2.9"	5' 8.7"	8' 6.2"	13' 5.3"	24' 5.1"	41' 3.6"	∞	∞
f/1.8	NEAR	1' 5.3"	2' 9"	4' 4.1"	5' 9.3"	7' 7.9"	10' 3.2"	12' 4.5"	19' 7.5"	32' 2.7"
	FAR	1' 6.8"	3' 3.5"	5'10.7"	8'10.9"	14' 5.3"	27'11.3"	52' 6.1"	∞	∞
f/1.9	NEAR	1' 5.2"	2' 8.9"	4' 3.8"	5' 8.6"	7' 6.7"	10' 1.1"	12' 1.4"	18'11.9"	30' 6.3"
	FAR	1' 6.8"	3' 3.7"	5'11.4"	9' 0.5"	14' 9.7"	29' 4.3"	57' 8.8"	∞	∞
f/2	NEAR	1' 5.2"	2' 8.8"	4' 3.4"	5' 7.9"	7' 5.6"	9'11"	11'10.5"	18' 4.7"	29' 0.1"
	FAR	1' 6.9"	3' 3.9"	6' 0.2"	9' 2.2"	15' 2.3"	30'11"	64' 1.3"	∞	∞
f/2.8	NEAR	1' 4.9"	2' 7.6"	4' 0.6"	5' 3.1"	6' 9.3"	8' 8.9"	10' 2.6"	14' 8.2"	20' 8.9"
	FAR	1' 7.3"	3' 5.8"	6' 6.5"	10' 6"	19' 2.2"	53'10.2"	558' 1.7"	∞	∞
f/4	NEAR	1' 4.4"	2' 6.1"	3' 9"	4' 9.1"	5'11.5"	7' 5"	8' 5.4"	11' 3.4"	14' 6.4"
	FAR	1' 7.9"	3' 8.9"	7' 6.6"	13' 4.5"	31' 8.8"	∞	∞	∞	∞
f/5.6	NEAR	1' 3.9"	2' 4.2"	3' 4.9"	4' 2.6"	5' 1.6"	6' 2.1"	6'10.5"	8' 7.6"	10' 4.8"
	FAR	1' 8.7"	4' 1.9"	9' 6"	21' 1.5"	254' 4.8"	∞	∞	∞	∞
f/8	NEAR	1' 3.2"	2' 1.9"	3'	3' 7.3"	4' 3.1"	4'11.3"	5' 4.5"	6' 4.7"	7' 3.6"
	FAR	1'10.2"	4'11.9"	15' 6.7"	166' 2.6"	∞	∞	∞	∞	∞
f/11	NEAR	1' 2.3"	1'11.4"	2' 7.4"	3' 0.7"	3' 6.1"	3'11.5"	4' 2.8"	4' 9.9"	5' 4"
	FAR	2' 0.4"	6' 8.2"	78' 7.7"	∞	∞	∞	∞	∞	∞
f/16	NEAR	1' 1.1"	1' 8.3"	2' 1.9"	2' 5.3"	2' 8.6"	2'11.8"	3' 1.6"	3' 5.3"	3' 8.2"
	FAR	2' 5.2"	15' 5.8"	∞	∞	∞	∞	∞	∞	∞
f/22	NEAR	0'11.9"	1' 5.5"	1' 9.4"	1'11.7"	2' 1.8"	2' 3.7"	2' 4.7"	2' 6.8"	2' 8.4"
	FAR	3' 2.5"	∞	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.7"	2'10.7"	4' 8.4"	6' 5.1"	8'10.3"	12' 6.6"	15'10.4"	30' 2.7"	76' 2.6"
	FAR	1' 6.3"	3' 1.4"	5' 4.1"	7' 8.3"	11' 5.9"	18' 7.7"	27' 0.8"	145' 1.1"	∞
f/1.2	NEAR	1' 5.6"	2'10.4"	4' 7.5"	6' 3.4"	8' 7.1"	12' 0.4"	15' 0.6"	27' 4.6"	60' 4.3"
	FAR	1' 6.4"	3' 1.8"	5' 5.3"	7'10.8"	11'11.5"	19'11"	29'10.1"	290' 9.4"	∞
f/1.4	NEAR	1' 5.5"	2'10.1"	4' 6.8"	6' 2.2"	8' 4.8"	11' 7.8"	14' 5.4"	25' 5.6"	51' 8.9"
	FAR	1' 6.5"	3' 2.1"	5' 6.2"	8' 0.9"	12' 4.4"	21' 0.8"	32' 6.2"	1481' 0.9"	∞
f/1.5	NEAR	1' 5.5"	2'10"	4' 6.5"	6' 1.6"	8' 3.7"	11' 5.6"	14' 2.1"	24' 7.2"	48' 3.6"
	FAR	1' 6.5"	3' 2.3"	5' 6.7"	8' 2"	12' 6.9"	21' 8.3"	34' 0.5"	∞	∞
f/1.8	NEAR	1' 5.4"	2' 9.6"	4' 5.5"	5'11.8"	8' 0.4"	10'11.5"	13' 4.7"	22' 4"	40' 3.1"
	FAR	1' 6.6"	3' 2.7"	5' 8.3"	8' 5.4"	13' 3.1"	23' 9.9"	39' 7.3"	∞	∞
f/1.9	NEAR	1' 5.4"	2' 9.5"	4' 5.2"	5'11.2"	7'11.3"	10' 9.5"	13' 1.8"	21' 8.1"	38' 1.7"
	FAR	1' 6.7"	3' 2.9"	5' 8.8"	8' 6.5"	13' 6.1"	24' 7.6"	41'10.7"	∞	∞
f/2	NEAR	1' 5.3"	2' 9.3"	4' 4.9"	5'10.6"	7'10.3"	10' 7.6"	12'11"	21' 0.5"	36' 2.9"
	FAR	1' 6.7"	3' 3.1"	5' 9.3"	8' 7.7"	13' 9.1"	25' 6"	44' 5.5"	∞	∞
f/2.8	NEAR	1' 5.1"	2' 8.4"	4' 2.5"	5' 6.4"	7' 2.9"	9' 6.4"	11' 3.8"	17' 1.1"	25'10.9"
	FAR	1' 7"	3' 4.5"	6' 2"	9' 6.5"	16' 2.4"	35' 5.3"	87' 3.2"	∞	∞
f/4	NEAR	1' 4.7"	2' 7.1"	3'11.3"	5' 1"	6' 5.8"	8' 3"	9' 6.6"	13' 4.1"	18' 1.9"
	FAR	1' 7.5"	3' 6.8"	6'10.2"	11' 3.7"	22' 1.1"	85' 8.1"	∞	∞	∞
f/5.6	NEAR	1' 4.3"	2' 5.5"	3' 7.7"	4' 7"	5' 8.2"	6'11.9"	7'10.9"	10' 4"	12'11.8"
	FAR	1' 8.1"	3'10.3"	8' 0.5"	15' 0.4"	43' 0.2"	∞	∞	∞	∞
f/8	NEAR	1' 3.6"	2' 3.4"	3' 3.1"	3'11.9"	4' 9.6"	5' 8.4"	6' 3.5"	7' 8.7"	9' 1.3"
	FAR	1' 9.2"	4' 4.8"	10'11"	29' 9.3"	∞	∞	∞	∞	∞
f/11	NEAR	1' 2.9"	2' 1.1"	2'10.6"	3' 5.3"	4' 0.3"	4' 7.6"	5' 0.2"	5'10.6"	6' 7.7"
	FAR	1'10.8"	5' 4.2"	19' 9.3"	∞	∞	∞	∞	∞	∞
f/16	NEAR	1' 1.9"	1'10.2"	2' 5.1"	2' 9.7"	3' 2.1"	3' 6.5"	3' 9.1"	4' 2.6"	4' 7.1"
	FAR	2' 1.9"	8' 4.7"	∞	∞	∞	∞	∞	∞	∞
f/22	NEAR	1' 0.8"	1' 7.4"	2' 0.5"	2' 3.6"	2' 6.5"	2' 9.2"	2'10.7"	3' 1.8"	3' 4.3"
	FAR	2' 7.2"	26'11.3"	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.7"	2' 10.7"	4' 8.6"	6' 5.4"	8' 10.8"	12' 7.7"	16' 0.1"	30' 9.1"	79' 7.8"
	FAR	1' 6.3"	3' 1.3"	5' 3.9"	7' 7.9"	11' 5"	18' 5.3"	26' 7.8"	134' 0.7"	∞
f/1.2	NEAR	1' 5.6"	2' 10.4"	4' 7.7"	6' 3.8"	8' 7.8"	12' 1.7"	15' 2.6"	27' 11.1"	63' 0.9"
	FAR	1' 6.4"	3' 1.7"	5' 5"	7' 10.3"	11' 10.3"	19' 7.6"	29' 2.6"	240' 8"	∞
f/1.4	NEAR	1' 5.6"	2' 10.2"	4' 7.1"	6' 2.6"	8' 5.5"	11' 9.2"	14' 7.6"	26' 0.2"	54' 0.9"
	FAR	1' 6.5"	3' 2"	5' 5.9"	8' 0.2"	12' 2.8"	20' 8.4"	31' 7.8"	662' 0.2"	∞
f/1.5	NEAR	1' 5.5"	2' 10.1"	4' 6.7"	6' 2"	8' 4.4"	11' 7.1"	14' 4.3"	25' 1.9"	50' 5.7"
	FAR	1' 6.5"	3' 2.1"	5' 6.4"	8' 1.2"	12' 5.2"	21' 3.3"	33' 0.3"	5325' 0.1"	∞
f/1.8	NEAR	1' 5.4"	2' 9.7"	4' 5.8"	6' 0.3"	8' 1.2"	11' 1.1"	13' 7.1"	22' 10.6"	42' 0.9"
	FAR	1' 6.6"	3' 2.6"	5' 7.8"	8' 4.4"	13' 0.8"	23' 2.7"	37' 11.7"	∞	∞
f/1.9	NEAR	1' 5.4"	2' 9.6"	4' 5.5"	5' 11.7"	8' 0.2"	10' 11.2"	13' 4.2"	22' 2.6"	39' 10.4"
	FAR	1' 6.6"	3' 2.8"	5' 8.3"	8' 5.5"	13' 3.6"	23' 11.5"	39' 11.8"	∞	∞
f/2	NEAR	1' 5.4"	2' 9.5"	4' 5.2"	5' 11.2"	7' 11.2"	10' 9.3"	13' 1.5"	21' 7.1"	37' 10.5"
	FAR	1' 6.7"	3' 2.9"	5' 8.8"	8' 6.6"	13' 6.4"	24' 8.8"	42' 2.4"	∞	∞
f/2.8	NEAR	1' 5.1"	2' 8.6"	4' 2.9"	5' 7.1"	7' 4"	9' 8.3"	11' 6.5"	17' 7.2"	27' 0.9"
	FAR	1' 6.9"	3' 4.2"	6' 1.2"	9' 4.7"	15' 9.2"	33' 5.3"	76' 1.1"	∞	∞
f/4	NEAR	1' 4.8"	2' 7.3"	3' 11.8"	5' 1.7"	6' 7"	8' 5"	9' 9.3"	13' 9.4"	18' 11.7"
	FAR	1' 7.4"	3' 6.4"	6' 8.8"	11'	20' 11.6"	70' 11.9"	∞	∞	∞
f/5.6	NEAR	1' 4.4"	2' 5.8"	3' 8.2"	4' 7.9"	5' 9.6"	7' 2"	8' 1.5"	10' 8.4"	13' 6.9"
	FAR	1' 8"	3' 9.7"	7' 9.9"	14' 3.5"	37' 6.2"	∞	∞	∞	∞
f/8	NEAR	1' 3.8"	2' 3.7"	3' 3.8"	4' 0.9"	4' 11"	5' 10.4"	6' 5.9"	8' 0.3"	9' 6.3"
	FAR	1' 9"	4' 3.7"	10' 4.2"	25' 11.7"	∞	∞	∞	∞	∞
f/11	NEAR	1' 3.1"	2' 1.5"	2' 11.4"	3' 6.3"	4' 1.7"	4' 9.4"	5' 2.3"	6' 1.4"	6' 11.4"
	FAR	1' 10.4"	5' 1.9"	17' 5"	∞	∞	∞	∞	∞	∞
f/16	NEAR	1' 2.1"	1' 10.6"	2' 5.9"	2' 10.6"	3' 3.3"	3' 8"	3' 10.8"	4' 4.7"	4' 9.6"
	FAR	2' 1.3"	7' 8.7"	∞	∞	∞	∞	∞	∞	∞
f/22	NEAR	1' 1"	1' 7.9"	2' 1.2"	2' 4.5"	2' 7.6"	2' 10.5"	3' 0.1"	3' 3.5"	3' 6.2"
	FAR	2' 6"	19' 6.3"	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.8"	2' 11"	4' 9.2"	6' 6.6"	9' 1.2"	13' 0.6"	16' 8.1"	33' 3.8"	99' 6.5"
	FAR	1' 6.2"	3' 1"	5' 3.1"	7' 6.2"	11' 1.2"	17' 7.6"	24' 11.9"	100' 3.7"	∞
f/1.2	NEAR	1' 5.7"	2' 10.7"	4' 8.5"	6' 5.3"	8' 10.7"	12' 7.5"	15' 11.7"	30' 7.6"	78' 9.8"
	FAR	1' 6.3"	3' 1.3"	5' 3.9"	7' 8"	11' 5.2"	18' 5.9"	26' 9"	136' 5.7"	∞
f/1.4	NEAR	1' 5.6"	2' 10.5"	4' 8"	6' 4.3"	8' 8.7"	12' 3.6"	15' 5.5"	28' 9.3"	67' 6.8"
	FAR	1' 6.4"	3' 1.6"	5' 4.6"	7' 9.5"	11' 8.5"	19' 2.8"	28' 4.1"	191' 10.1"	∞
f/1.5	NEAR	1' 5.6"	2' 10.4"	4' 7.7"	6' 3.8"	8' 7.8"	12' 1.7"	15' 2.6"	27' 11.1"	63' 0.9"
	FAR	1' 6.4"	3' 1.7"	5' 5"	7' 10.3"	11' 10.3"	19' 7.6"	29' 2.6"	240' 8"	∞
f/1.8	NEAR	1' 5.5"	2' 10.1"	4' 6.9"	6' 2.3"	8' 5.1"	11' 8.4"	14' 6.2"	25' 8"	52' 6.9"
	FAR	1' 6.5"	3' 2"	5' 6.1"	8' 0.6"	12' 3.7"	20' 11.1"	32' 2.2"	1018' 10.6"	∞
f/1.9	NEAR	1' 5.5"	2' 10"	4' 6.7"	6' 1.9"	8' 4.2"	11' 6.7"	14' 3.6"	24' 11.9"	49' 9.7"
	FAR	1' 6.5"	3' 2.2"	5' 6.5"	8' 1.4"	12' 5.7"	21' 4.8"	33' 3.8"	∞	∞
f/2	NEAR	1' 5.5"	2' 9.9"	4' 6.4"	6' 1.4"	8' 3.3"	11' 5"	14' 1.1"	24' 4.2"	47' 3.9"
	FAR	1' 6.5"	3' 2.3"	5' 6.9"	8' 2.3"	12' 7.6"	21' 10.7"	34' 6.3"	∞	∞
f/2.8	NEAR	1' 5.3"	2' 9.2"	4' 4.5"	5' 9.9"	7' 9"	10' 5.1"	12' 7.3"	20' 2.6"	33' 9.9"
	FAR	1' 6.7"	3' 3.3"	5' 10.1"	8' 9.5"	14' 1.6"	26' 9.9"	48' 8.5"	∞	∞
f/4	NEAR	1' 5"	2' 8.1"	4' 1.8"	5' 5.2"	7' 0.8"	9' 2.7"	10' 10.6"	16' 1.4"	23' 8.4"
	FAR	1' 7.1"	3' 4.9"	6' 3.5"	9' 10.5"	17' 2.2"	40' 7.1"	127' 2.8"	∞	∞
f/5.6	NEAR	1' 4.7"	2' 6.8"	3' 10.7"	4' 11.8"	6' 3.9"	8'	9' 2.6"	12' 8.3"	16' 11.4"
	FAR	1' 7.6"	3' 7.3"	7' 0.3"	11' 9.8"	24' 1.9"	129' 1"	∞	∞	∞
f/8	NEAR	1' 4.2"	2' 5"	3' 6.6"	4' 5.3"	5' 5.6"	6' 8.1"	7' 5.9"	9' 7.6"	11' 10.7"
	FAR	1' 8.3"	3' 11.5"	8' 6.2"	16' 9.7"	62' 1"	∞	∞	∞	∞
f/11	NEAR	1' 3.6"	2' 3.1"	3' 2.5"	3' 10.9"	4' 8.2"	5' 6.4"	6' 1"	7' 4.9"	8' 8"
	FAR	1' 9.4"	4' 6"	11' 7.2"	35' 8.9"	∞	∞	∞	∞	∞
f/16	NEAR	1' 2.7"	2' 0.4"	2' 9.2"	3' 3.2"	3' 9.4"	4' 3.7"	4' 7.6"	5' 4.3"	5' 11.8"
	FAR	1' 11.4"	5' 10.3"	29' 7.3"	∞	∞	∞	∞	∞	∞
f/22	NEAR	1' 1.8"	1' 9.8"	2' 4.5"	2' 8.8"	3' 0.9"	3' 5"	3' 7.3"	4' 0.4"	4' 4.5"
	FAR	2' 2.4"	9' 2.4"	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	inf.
f/0.95	NEAR	1' 5.8"	2' 11.1"	4' 9.4"	6' 7"	9' 2"	13' 2.4"	16' 10.9"	34' 3.1"	108' 4.7"
	FAR	1' 6.2"	3' 0.9"	5' 2.8"	7' 5.7"	11'	17' 4.6"	24' 5.8"	92' 7.9"	∞
f/1.2	NEAR	1' 5.7"	2' 10.8"	4' 8.8"	6' 5.8"	8' 11.7"	12' 9.5"	16' 3"	31' 7.7"	85' 10"
	FAR	1' 6.3"	3' 1.2"	5' 3.6"	7' 7.3"	11' 3.5"	18' 1.7"	26' 0.2"	119' 6.2"	∞
f/1.4	NEAR	1' 5.7"	2' 10.7"	4' 8.3"	6' 4.9"	8' 9.9"	12' 5.8"	15' 9.1"	29' 9.8"	73' 7"
	FAR	1' 6.3"	3' 1.4"	5' 4.2"	7' 8.6"	11' 6.5"	18' 9.5"	27' 4.8"	155' 7.4"	∞
f/1.5	NEAR	1' 5.7"	2' 10.6"	4' 8.1"	6' 4.4"	8' 9"	12' 4.1"	15' 6.3"	28' 11.8"	68' 8.2"
	FAR	1' 6.3"	3' 1.5"	5' 4.5"	7' 9.3"	11' 8.1"	19' 1.7"	28' 1.7"	183' 3.8"	∞
f/1.8	NEAR	1' 5.6"	2' 10.3"	4' 7.3"	6' 3.1"	8' 6.4"	11' 11"	14' 10.3"	26' 8.8"	57' 3"
	FAR	1' 6.4"	3' 1.9"	5' 5.5"	7' 11.4"	12' 0.9"	20' 3.1"	30' 7.7"	393' 6"	∞
f/1.9	NEAR	1' 5.6"	2' 10.2"	4' 7.1"	6' 2.6"	8' 5.6"	11' 9.4"	14' 7.8"	26' 0.8"	54' 2.9"
	FAR	1' 6.4"	3' 2"	5' 5.9"	8' 0.1"	12' 2.6"	20' 8"	31' 6.9"	637' 0.5"	∞
f/2	NEAR	1' 5.5"	2' 10.1"	4' 6.9"	6' 2.2"	8' 4.8"	11' 7.8"	14' 5.3"	25' 5.1"	51' 6.4"
	FAR	1' 6.5"	3' 2.1"	5' 6.2"	8' 0.9"	12' 4.4"	21' 1"	32' 6.8"	1872' 2.7"	∞
f/2.8	NEAR	1' 5.4"	2' 9.4"	4' 5.1"	5' 10.9"	7' 10.7"	10' 8.4"	13' 0.1"	21' 3.1"	36' 10"
	FAR	1' 6.7"	3' 3"	5' 9.1"	8' 7.2"	13' 7.9"	25' 2.1"	43' 6.5"	∞	∞
f/4	NEAR	1' 5.1"	2' 8.4"	4' 2.6"	5' 6.5"	7' 2.9"	9' 6.4"	11' 3.8"	17' 0.8"	25' 9.8"
	FAR	1' 7"	3' 4.4"	6' 1.9"	9' 6.5"	16' 2.5"	35' 6.6"	88' 2.1"	∞	∞
f/5.6	NEAR	1' 4.8"	2' 7.2"	3' 11.6"	5' 1.4"	6' 6.3"	8' 3.9"	9' 7.8"	13' 6.3"	18' 5.6"
	FAR	1' 7.4"	3' 6.5"	6' 9.5"	11' 2"	21' 7.2"	79' 1.8"	∞	∞	∞
f/8	NEAR	1' 4.3"	2' 5.6"	3' 7.7"	4' 7"	5' 8.3"	7'	7' 10.9"	10' 3.8"	12' 11.4"
	FAR	1' 8.1"	3' 10.2"	8' 0.3"	15' 0.3"	43' 3"	∞	∞	∞	∞
f/11	NEAR	1' 3.8"	2' 3.7"	3' 3.7"	4' 0.8"	4' 10.8"	5' 10.1"	6' 5.5"	7' 11.6"	9' 5.3"
	FAR	1' 9"	4' 3.7"	10' 5"	26' 6.4"	∞	∞	∞	∞	∞
f/16	NEAR	1' 3"	2' 1.1"	2' 10.5"	3' 5.1"	3' 11.9"	4' 7"	4' 11.4"	5' 9.5"	6' 6.3"
	FAR	1' 10.7"	5' 4.8"	20' 9.9"	∞	∞	∞	∞	∞	∞
f/22	NEAR	1' 2.1"	1' 10.6"	2' 5.8"	2' 10.6"	3' 3.2"	3' 7.8"	3' 10.5"	4' 4.4"	4' 9.2"
	FAR	2' 1.3"	7' 9.3"	∞	∞	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.8"	2' 11.3"	4' 9.9"	6' 8"	9' 3.9"	13' 6.3"	17' 5.4"	36' 6.7"	135' 5.6"
	FAR	1' 6.2"	3' 0.7"	5' 2.2"	7' 4.5"	10' 9.4"	16' 10.1"	23' 5.2"	79' 1.7"	∞
f/1.2	NEAR	1' 5.8"	2' 11.1"	4' 9.4"	6' 7"	9' 1.9"	13' 2.2"	16' 10.6"	34' 1.7"	107' 3.2"
	FAR	1' 6.2"	3' 1"	5' 2.8"	7' 5.7"	11' 0.1"	17' 4.9"	24' 6.5"	93' 5.9"	∞
f/1.4	NEAR	1' 5.7"	2' 10.9"	4' 9"	6' 6.2"	9' 0.4"	12' 11"	16' 5.4"	32' 5.2"	91' 11.5"
	FAR	1' 6.3"	3' 1.1"	5' 3.3"	7' 6.8"	11' 2.4"	17' 10.7"	25' 6.1"	109' 4.4"	∞
f/1.5	NEAR	1' 5.7"	2' 10.8"	4' 8.8"	6' 5.8"	8' 11.7"	12' 9.5"	16' 3"	31' 7.7"	85' 10"
	FAR	1' 6.3"	3' 1.2"	5' 3.6"	7' 7.3"	11' 3.5"	18' 1.7"	26' 0.2"	119' 6.2"	∞
f/1.8	NEAR	1' 5.7"	2' 10.6"	4' 8.2"	6' 4.7"	8' 9.5"	12' 5.1"	15' 7.9"	29' 5.7"	71' 6.5"
	FAR	1' 6.3"	3' 1.5"	5' 4.3"	7' 8.9"	11' 7.1"	18' 11.2"	27' 8.3"	185' 7.6"	∞
f/1.9	NEAR	1' 5.6"	2' 10.5"	4' 8"	6' 4.3"	8' 8.8"	12' 3.7"	15' 5.7"	28' 9.8"	67' 9.4"
	FAR	1' 6.4"	3' 1.5"	5' 4.6"	7' 9.4"	11' 8.4"	19' 2.5"	28' 3.5"	190' 1"	∞
f/2	NEAR	1' 5.6"	2' 10.5"	4' 7.6"	6' 4"	8' 8.1"	12' 2.3"	15' 3.5"	28' 2.3"	64' 4.8"
	FAR	1' 6.4"	3' 1.6"	5' 4.9"	7' 10"	11' 9.7"	19' 6"	28' 11.1"	223' 0.2"	∞
f/2.8	NEAR	1' 5.5"	2' 9.9"	4' 6.3"	6' 1.2"	8' 2.9"	11' 4.2"	13' 11.8"	24' 0.1"	46' 0.3"
	FAR	1' 6.5"	3' 2.3"	5' 7"	8' 2.7"	12' 8.7"	22' 2"	35' 2.8"	∞	∞
f/4	NEAR	1' 5.3"	2' 9.1"	4' 4.2"	5' 9.3"	7' 8"	10' 3.3"	12' 4.6"	19' 7.8"	32' 2.9"
	FAR	1' 6.8"	3' 3.5"	5' 10.6"	8' 10.7"	14' 5"	27' 10.7"	52' 4.4"	∞	∞
f/5.6	NEAR	1' 5"	2' 8.1"	4' 1.6"	5' 4.8"	7' 0.2"	9' 1.6"	10' 9.1"	15' 9.8"	23' 0.7"
	FAR	1' 7.1"	3' 5"	6' 4"	9' 11.7"	17' 6.2"	42' 7"	149' 7.4"	∞	∞
f/8	NEAR	1' 4.6"	2' 6.6"	3' 10.2"	4' 11.1"	6' 2.7"	7' 9.9"	8' 11.8"	12' 3"	16' 2"
	FAR	1' 7.6"	3' 7.7"	7' 1.9"	12' 2.5"	25' 11"	205' 3.5"	∞	∞	∞
f/11	NEAR	1' 4.2"	2' 5"	3' 6.6"	4' 5.2"	5' 5.5"	6' 7.7"	7' 5.5"	9' 6.8"	11' 9.4"
	FAR	1' 8.3"	3' 11.5"	8' 6.6"	16' 11.8"	65' 0.5"	∞	∞	∞	∞
f/16	NEAR	1' 3.5"	2' 2.7"	3' 1.7"	3' 9.7"	4' 6.4"	5' 3.8"	5' 9.8"	7' 0.2"	8' 1.6"
	FAR	1' 9.6"	4' 7.7"	12' 8.4"	49' 3.6"	∞	∞	∞	∞	∞
f/22	NEAR	1' 2.7"	2' 0.4"	2' 9.1"	3' 3.1"	3' 9.2"	4' 3.5"	4' 7.3"	5' 3.9"	5' 11.3"
	FAR	1' 11.3"	5' 10.5"	30' 8.3"	∞	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.9"	2'11.4"	4'10.4"	6' 8.8"	9' 5.5"	13' 9.6"	17'10.9"	36' 7.7"	169' 4"
	FAR	1' 6.1"	3' 0.6"	5' 1.7"	7' 3.5"	10' 7.4"	16' 5.2"	22' 7.8"	70'10.2"	∞
f/1.2	NEAR	1' 5.8"	2'11.3"	4' 9.9"	6' 8"	9' 3.8"	13' 6.1"	17' 5.2"	36' 5.6"	134' 1"
	FAR	1' 6.2"	3' 0.7"	5' 2.2"	7' 4.5"	10' 9.5"	16'10.3"	23' 5.6"	79' 7.2"	∞
f/1.4	NEAR	1' 5.8"	2'11.1"	4' 9.6"	6' 7.3"	9' 2.6"	13' 3.5"	17' 0.8"	34'10.7"	114'11.3"
	FAR	1' 6.2"	3' 0.9"	5' 2.6"	7' 5.3"	10'11.2"	17' 2.6"	24' 2"	88' 3.8"	∞
f/1.5	NEAR	1' 5.8"	2'11.1"	4' 9.4"	6' 7"	9' 2"	13' 2.2"	16'10.7"	34' 1.9"	107' 3.5"
	FAR	1' 6.2"	3' 0.9"	5' 2.8"	7' 5.7"	11' 0.1"	17' 4.8"	24' 6.4"	93' 5.3"	∞
f/1.8	NEAR	1' 5.7"	2'10.9"	4' 9"	6' 6.1"	9' 0.2"	12'10.5"	16' 4.5"	32' 1.5"	89' 5.1"
	FAR	1' 6.3"	3' 1.1"	5' 3.4"	7' 6.9"	11' 2.8"	17'11.7"	25' 8.3"	113' 1.4"	∞
f/1.9	NEAR	1' 5.7"	2'10.8"	4' 8.8"	6' 5.8"	8'11.6"	12' 9.3"	16' 2.6"	31' 6"	84' 8.7"
	FAR	1' 6.3"	3' 1.2"	5' 3.6"	7' 7.3"	11' 3.7"	18' 2.1"	26' 1.3"	121' 7.9"	∞
f/2	NEAR	1' 5.7"	2'10.8"	4' 8.6"	6' 5.5"	8'11"	12' 8.1"	16' 0.7"	30'10.8"	80' 5.9"
	FAR	1' 6.3"	3' 1.3"	5' 3.8"	7' 7.8"	11' 4.6"	18' 4.6"	26' 6.4"	131' 7.2"	∞
f/2.8	NEAR	1' 5.6"	2'10.3"	4' 7.4"	6' 3.2"	8' 6.6"	11'11.2"	16'10.6"	26' 9.7"	57' 6.4"
	FAR	1' 6.4"	3' 1.8"	5' 5.5"	7'11.3"	12' 0.7"	20' 2.5"	30' 6.4"	380' 6"	∞
f/4	NEAR	1' 5.4"	2' 9.7"	4' 5.6"	5'11.9"	8' 0.6"	10'11.7"	13' 5"	22' 4.5"	40' 3.7"
	FAR	1' 6.6"	3' 2.7"	5' 8.1"	8' 5.1"	13' 2.7"	23' 9.1"	39' 5.7"	∞	∞
f/5.6	NEAR	1' 5.2"	2' 8.8"	4' 3.5"	5' 8"	7' 5.6"	9'11"	11'10.4"	18' 4"	28' 9.9"
	FAR	1' 6.8"	3' 3.8"	6'	9' 2.1"	15' 2.3"	31' 0.4"	64' 9.9"	∞	∞
f/8	NEAR	1' 4.9"	2' 7.6"	4' 0.5"	5' 2.9"	6' 8.9"	8' 8"	10' 1.3"	14' 5.3"	20' 2.5"
	FAR	1' 7.2"	3' 5.8"	6' 6.8"	10' 7.1"	19' 6.8"	57' 6.3"	1903' 2.2"	∞	∞
f/11	NEAR	1' 4.6"	2' 6.3"	3' 9.3"	4' 9.5"	6' 0.1"	7' 5.9"	8' 6.5"	11' 5"	14' 8.8"
	FAR	1' 7.7"	3' 8.5"	7' 5.4"	13' 1.7"	30' 7.9"	∞	∞	∞	∞
f/16	NEAR	1' 4"	2' 4.3"	3' 4.8"	4' 2.4"	5' 1.2"	6' 1.4"	6' 9.5"	8' 5.7"	10' 1.9"
	FAR	1' 8.6"	4' 1.9"	9' 7.5"	22'	61' 8.4"	∞	∞	∞	∞
f/22	NEAR	1' 3.3"	2' 2.2"	3' 0.5"	3' 7.9"	4' 3.8"	5' 0.2"	5' 5.5"	6' 5.9"	7' 5.1"
	FAR	1' 9.9"	4'10.5"	14'10.2"	119' 8.3"	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.9"	2'11.5"	4'10.7"	6' 9.4"	9' 6.7"	14' 0.3"	18' 3.5"	40' 5.8"	211' 7.7"
	FAR	1' 6.1"	3' 0.5"	5' 1.4"	7' 2.8"	10' 5.8"	16' 1.5"	22' 0.8"	65' 4.7"	∞
f/1.2	NEAR	1' 5.9"	2'11.4"	4'10.3"	6' 8.8"	9' 5.4"	13' 9.4"	17'10.7"	38' 6.6"	167' 6.9"
	FAR	1' 6.1"	3' 0.6"	5' 1.8"	7' 3.6"	10' 7.4"	16' 5.4"	22' 8.2"	71' 2"	∞
f/1.4	NEAR	1' 5.8"	2'11.3"	4'10.1"	6' 8.2"	9' 4.4"	13' 7.2"	17' 7"	37' 1.6"	143' 7.8"
	FAR	1' 6.2"	3' 0.7"	5' 2.1"	7' 4.2"	10' 8.8"	16' 8.7"	23' 2.4"	76' 6.9"	∞
f/1.5	NEAR	1' 5.8"	2'11.3"	4' 9.9"	6' 8"	9' 3.8"	13' 6.1"	17' 5.2"	36' 5.6"	134' 1"
	FAR	1' 6.2"	3' 0.7"	5' 2.2"	7' 4.5"	10' 9.5"	16'10.3"	23' 5.6"	79' 7.2"	∞
f/1.8	NEAR	1' 5.8"	2'11.1"	4' 9.5"	6' 7.2"	9' 2.4"	13' 3"	16'11.9"	34' 7.1"	111' 9.1"
	FAR	1' 6.2"	3' 0.9"	5' 2.7"	7' 5.4"	10'11.5"	17' 3.5"	24' 3.7"	90' 3.6"	∞
f/1.9	NEAR	1' 5.8"	2'11.1"	4' 9.4"	6' 7"	9' 1.9"	13' 2"	16'10.2"	34' 0.1"	105'10.5"
	FAR	1' 6.2"	3' 1"	5' 2.8"	7' 5.8"	11' 0.2"	17' 6.3"	24' 7.3"	94' 6.4"	∞
f/2	NEAR	1' 5.8"	2'11"	4' 9.3"	6' 6.7"	9' 1.4"	13' 1"	16' 8.6"	33' 5.4"	100' 7.1"
	FAR	1' 6.2"	3' 1"	5' 3"	7' 6.1"	11' 0.9"	17' 7.1"	24'10.9"	99' 2.3"	∞
f/2.8	NEAR	1' 5.7"	2'10.6"	4' 8.3"	6' 4.8"	8' 9.6"	12' 5.3"	15' 8.2"	29' 6.5"	71'10.6"
	FAR	1' 6.3"	3' 1.4"	5' 4.3"	7' 8.8"	11' 6.9"	18'10.7"	27' 7.5"	163' 8.6"	∞
f/4	NEAR	1' 5.5"	2'10.1"	4' 6.8"	6' 2.1"	8' 4.5"	11' 7.2"	14' 4.3"	25' 1.7"	50' 4.2"
	FAR	1' 6.5"	3' 2.1"	5' 6.3"	8' 1.1"	12' 5.1"	21' 3.2"	33' 0.3"	7105'10.2"	∞
f/5.6	NEAR	1' 5.4"	2' 9.4"	4' 5"	5'10.7"	7'10.4"	10' 7.6"	12'10.9"	20'11.8"	36'
	FAR	1' 6.7"	3' 3"	5' 9.2"	8' 7.6"	13' 9.1"	25' 6.6"	44' 8.6"	∞	∞
f/8	NEAR	1' 5.1"	2' 8.4"	4' 2.5"	5' 6.2"	7' 2.5"	9' 5.5"	11' 2.6"	16' 9.9"	25' 2.8"
	FAR	1' 7"	3' 4.5"	6' 2.2"	9' 7.2"	16' 5"	38' 7.8"	95' 6.6"	∞	∞
f/11	NEAR	1' 4.8"	2' 7.3"	3'11.6"	5' 1.4"	6' 6.3"	8' 3.8"	9' 7.6"	13' 5.8"	18' 4.6"
	FAR	1' 7.4"	3' 6.5"	6' 9.4"	11' 2"	21' 7.9"	80' 5.9"	∞	∞	∞
f/16	NEAR	1' 4.3"	2' 5.5"	3' 7.6"	4' 6.8"	5' 7.8"	6'11.1"	7' 9.7"	10' 1.8"	12' 8.1"
	FAR	1' 8.1"	3'10.3"	8' 1.3"	15' 4.3"	46' 6.5"	∞	∞	∞	∞
f/22	NEAR	1' 3.8"	2' 3.7"	3' 3.6"	4' 0.5"	4'10.3"	5' 9.3"	6' 4.5"	7'10"	9' 3"
	FAR	1' 9"	4' 4"	10' 7.4"	28' 1.2"	∞	∞	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.9"	2' 11.7"	4' 11.2"	6' 10.4"	9' 8.7"	14' 4.7"	18' 11.1"	43' 8.6"	345' 6.2"
	FAR	1' 6.1"	3' 0.3"	5' 0.8"	7' 1.7"	10' 3.5"	15' 8"	21' 2.5"	58' 4.9"	∞
f/1.2	NEAR	1' 5.9"	2' 11.6"	4' 11"	6' 10"	9' 7.9"	14' 2.8"	18' 7.9"	42' 3.8"	273' 6.8"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2.1"	10' 4.4"	15' 10.2"	21' 6.6"	61' 1.3"	∞
f/1.4	NEAR	1' 5.9"	2' 11.6"	4' 10.8"	6' 9.7"	9' 7.2"	14' 1.4"	18' 5.4"	41' 3.1"	234' 6.1"
	FAR	1' 6.1"	3' 0.4"	5' 1.2"	7' 2.5"	10' 5.2"	16'	21' 10"	63' 5.5"	∞
f/1.5	NEAR	1' 5.9"	2' 11.5"	4' 10.7"	6' 9.5"	9' 6.9"	14' 0.7"	18' 4.2"	40' 9"	218' 10.6"
	FAR	1' 6.1"	3' 0.4"	5' 1.3"	7' 2.7"	10' 5.6"	16' 1"	21' 11.7"	64' 8.5"	∞
f/1.8	NEAR	1' 5.9"	2' 11.5"	4' 10.5"	6' 9"	9' 6"	13' 10.6"	18' 0.6"	39' 3.6"	182' 5.2"
	FAR	1' 6.1"	3' 0.5"	5' 1.6"	7' 3.2"	10' 6.7"	16' 3.8"	22' 5.1"	68' 9"	∞
f/1.9	NEAR	1' 5.9"	2' 11.4"	4' 10.4"	6' 8.9"	9' 5.6"	13' 9.9"	17' 11.5"	38' 10.1"	172' 10.1"
	FAR	1' 6.1"	3' 0.6"	5' 1.7"	7' 3.4"	10' 7.1"	16' 4.7"	22' 6.9"	70' 2.6"	∞
f/2	NEAR	1' 5.9"	2' 11.4"	4' 10.3"	6' 8.7"	9' 5.3"	13' 9.2"	17' 10.3"	38' 4.7"	164' 2.5"
	FAR	1' 6.1"	3' 0.6"	5' 1.8"	7' 3.6"	10' 7.5"	16' 5.7"	22' 8.7"	71' 9"	∞
f/2.8	NEAR	1' 5.8"	2' 11.2"	4' 9.7"	6' 7.5"	9' 2.9"	13' 4"	17' 1.5"	35' 1.5"	117' 4"
	FAR	1' 6.2"	3' 0.8"	5' 2.5"	7' 5.1"	10' 10.8"	17' 1.8"	24' 0.5"	86' 10.6"	∞
f/4	NEAR	1' 5.7"	2' 10.8"	4' 8.8"	6' 5.7"	8' 11.4"	12' 8.7"	16' 1.6"	31' 2"	82' 2.2"
	FAR	1' 6.3"	3' 1.2"	5' 3.6"	7' 7.5"	11' 4.1"	18' 3.3"	26' 3.9"	127' 2"	∞
f/5.6	NEAR	1' 5.6"	2' 10.4"	4' 7.6"	6' 3.4"	8' 7"	12'	14' 11.8"	27' 1.1"	58' 9"
	FAR	1' 6.4"	3' 1.7"	5' 5.2"	7' 10.9"	11' 11.8"	20' 0.4"	30' 1.8"	333' 9.9"	∞
f/8	NEAR	1' 5.5"	2' 9.8"	4' 5.9"	6' 0.3"	8' 1.2"	11' 0.7"	13' 6.4"	22' 7.9"	41' 2.1"
	FAR	1' 6.5"	3' 2.5"	5' 7.8"	8' 4.4"	13' 1.2"	23' 4.9"	38' 7"	∞	∞
f/11	NEAR	1' 5.3"	2' 9"	4' 3.9"	5' 8.7"	7' 6.7"	10' 0.9"	12' 0.9"	18' 9.9"	29' 11.9"
	FAR	1' 6.7"	3' 3.6"	5' 11.2"	9' 0.4"	14' 10.1"	29' 8.2"	59' 4.6"	∞	∞
f/16	NEAR	1' 5"	2' 7.9"	4' 0.9"	5' 3.5"	6' 9.7"	8' 9.3"	10' 3"	14' 8.3"	20' 8"
	FAR	1' 7.1"	3' 5.4"	6' 5.9"	10' 5.1"	19' 0.8"	53' 9.9"	607' 10.6"	∞	∞
f/22	NEAR	1' 4.7"	2' 6.6"	3' 9.8"	4' 10.2"	6' 1.1"	7' 7.2"	8' 8.1"	11' 7.7"	15' 0.9"
	FAR	1' 7.6"	3' 8"	7' 3.8"	12' 9.5"	29' 0.7"	2875' 4.2"	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.9"	2' 11.8"	4' 11.4"	6' 10.7"	9' 9.4"	14' 6.1"	19' 1.5"	44' 10.1"	431' 10.2"
	FAR	1' 6"	3' 0.2"	5' 0.7"	7' 1.3"	10' 2.8"	15' 6.3"	20' 11.5"	56' 6"	∞
f/1.2	NEAR	1' 5.9"	2' 11.7"	4' 11.2"	6' 10.4"	9' 8.7"	14' 4.6"	18' 10.9"	43' 7.9"	341' 11"
	FAR	1' 6.1"	3' 0.3"	5' 0.8"	7' 1.7"	10' 3.5"	15' 8.1"	21' 2.7"	58' 6.1"	∞
f/1.4	NEAR	1' 5.9"	2' 11.7"	4' 11.1"	6' 10.1"	9' 8.2"	14' 3.4"	18' 8.9"	42' 9.1"	293' 1.2"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2"	10' 4.1"	15' 9.5"	21' 5.3"	60' 2.6"	∞
f/1.5	NEAR	1' 5.9"	2' 11.6"	4' 11"	6' 10"	9' 7.9"	14' 2.8"	18' 7.9"	42' 3.8"	273' 6.8"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2.1"	10' 4.4"	15' 10.2"	21' 6.6"	61' 1.3"	∞
f/1.8	NEAR	1' 5.9"	2' 11.6"	4' 10.8"	6' 9.6"	9' 7.1"	14' 1.1"	18' 4.9"	41' 0.7"	228'
	FAR	1' 6.1"	3' 0.4"	5' 1.3"	7' 2.6"	10' 5.3"	16' 0.4"	21' 10.7"	63' 11.4"	∞
f/1.9	NEAR	1' 5.9"	2' 11.5"	4' 10.7"	6' 9.5"	9' 6.9"	14' 0.6"	18' 4"	40' 7.8"	216' 0.1"
	FAR	1' 6.1"	3' 0.4"	5' 1.3"	7' 2.7"	10' 5.6"	16' 1.1"	22' 0.1"	64' 11.5"	∞
f/2	NEAR	1' 5.9"	2' 11.5"	4' 10.7"	6' 9.4"	9' 6.6"	14' 1.2"	18' 3"	40' 3.1"	205' 2.6"
	FAR	1' 6.1"	3' 0.5"	5' 1.4"	7' 2.8"	10' 5.9"	16' 1.9"	22' 1.5"	66"	∞
f/2.8	NEAR	1' 5.8"	2' 11.3"	4' 10.1"	6' 8.4"	9' 4.6"	13' 7.6"	17' 7.6"	37' 4.2"	146' 7.6"
	FAR	1' 6.1"	3' 0.7"	5' 2"	7' 4"	10' 8.5"	16' 8.1"	23' 1.3"	75' 8.4"	∞
f/4	NEAR	1' 5.8"	2' 11.1"	4' 9.4"	6' 6.9"	9' 1.7"	13' 1.5"	16' 9.4"	33' 8.4"	102' 8.3"
	FAR	1' 6.2"	3' 1"	5' 2.9"	7' 5.9"	11' 0.5"	17' 6.1"	24' 9.1"	97' 1.6"	∞
f/5.6	NEAR	1' 5.7"	2' 10.7"	4' 8.4"	6' 5"	8' 10"	12' 6"	15' 9.3"	29' 9.8"	73' 4.8"
	FAR	1' 6.3"	3' 1.4"	5' 4.1"	7' 8.5"	11' 6.3"	18' 9.2"	27' 4.4"	156' 1.8"	∞
f/8	NEAR	1' 5.6"	2' 10.2"	4' 7"	6' 2.4"	8' 5"	11' 8"	14' 5.6"	25' 5.2"	51' 5.1"
	FAR	1' 6.4"	3' 2"	5' 6"	8' 0.6"	12' 4"	21' 0.5"	32' 6.2"	1790' 3"	∞
f/11	NEAR	1' 5.4"	2' 9.6"	4' 5.3"	5' 11.3"	7' 11.4"	10' 9.3"	13' 1.3"	21' 5.9"	37' 5.4"
	FAR	1' 6.6"	3' 2.8"	5' 8.6"	8' 6.4"	13' 6.3"	24' 9.7"	42' 6.6"	∞	∞
f/16	NEAR	1' 5.2"	2' 8.6"	4' 2.8"	5' 6.7"	7' 3.3"	9' 6.7"	11' 4.2"	17' 1.1"	25' 9.5"
	FAR	1' 6.9"	3' 4.2"	6' 1.5"	9' 5.9"	16' 1.5"	35' 4.7"	87' 10.7"	∞	∞
f/22	NEAR	1' 4.9"	2' 7.5"	4' 1.1"	5' 2"	6' 7.2"	8' 5.1"	9' 9.3"	13' 8.8"	18' 9.7"
	FAR	1' 7.2"	3' 6.1"	6' 8.3"	10' 11.5"	20' 11.8"	72' 10.1"	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance.		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.9"	2'11.8"	4'11.3"	6'10.7"	9' 9.3"	14' 5.9"	19' 1.2"	44' 8.3"	418' 0.7"
	FAR	1' 6"	3' 0.2"	5' 0.7"	7' 1.4"	10' 2.8"	15' 6.5"	20'11.8"	56' 8.9"	∞
f/1.2	NEAR	1' 5.9"	2'11.7"	4'11.2"	6'10.4"	9' 8.6"	14' 4.4"	18'10.6"	43' 5.8"	331'
	FAR	1' 6.1"	3' 0.3"	5' 0.9"	7' 1.7"	10' 3.6"	15' 8.3"	21' 3.2"	58'10"	∞
f/1.4	NEAR	1' 5.9"	2'11.7"	4'11"	6'10.1"	9' 8.1"	14' 3.2"	18' 8.5"	42' 6.7"	283' 8.9"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2"	10' 4.2"	15' 9.8"	21' 5.9"	60' 7.4"	∞
f/1.5	NEAR	1' 5.9"	2'11.6"	4'11"	6'10"	9' 7.8"	14' 2.6"	18' 7.4"	42' 1.3"	264'10"
	FAR	1' 6.1"	3' 0.3"	5' 1.1"	7' 2.2"	10' 4.5"	15'10.5"	21' 7.3"	61' 6.6"	∞
f/1.8	NEAR	1' 5.9"	2'11.6"	4'10.8"	6' 9.6"	9' 7"	14' 0.8"	18' 4.4"	40' 9.8"	220' 8.7"
	FAR	1' 6.1"	3' 0.4"	5' 1.3"	7' 2.6"	10' 5.5"	16' 0.8"	21'11.5"	64' 6.5"	∞
f/1.9	NEAR	1' 5.9"	2'11.5"	4'10.7"	6' 9.4"	9' 6.7"	14' 0.2"	18' 3.4"	40' 4.9"	209' 1.4"
	FAR	1' 6.1"	3' 0.4"	5' 1.4"	7' 2.8"	10' 5.8"	16' 1.6"	22' 0.9"	65' 7.2"	∞
f/2	NEAR	1' 5.9"	2'11.5"	4'10.6"	6' 9.3"	9' 6.4"	13'11.6"	18' 2.4"	40' 0.1"	198' 8.1"
	FAR	1' 6.1"	3' 0.5"	5' 1.4"	7' 2.9"	10' 6.1"	16' 2.3"	22' 2.4"	66' 8.3"	∞
f/2.8	NEAR	1' 5.8"	2'11.3"	4'10.1"	6' 8.3"	9' 4.4"	13' 7.2"	17' 6.8"	37' 0.6"	141'11.5"
	FAR	1' 6.1"	3' 0.7"	5' 2"	7' 4.2"	10' 8.8"	16' 8.8"	23' 2.7"	76'11.9"	∞
f/4	NEAR	1' 5.8"	2'11.1"	4' 9.3"	6' 6.8"	9' 1.4"	13' 0.9"	16' 8.4"	33' 4.2"	99' 5.1"
	FAR	1' 6.2"	3' 1"	5' 3"	7' 6.1"	11' 0.9"	17' 7.2"	24'11.3"	100' 2.6"	∞
f/5.6	NEAR	1' 5.7"	2'10.7"	4' 8.3"	6' 4.8"	8' 9.7"	12' 5.3"	15' 8"	29' 5.3"	71' 0.8"
	FAR	1' 6.3"	3' 1.4"	5' 4.2"	7' 8.7"	11' 6.9"	18'11"	27' 8.3"	167' 9.6"	∞
f/8	NEAR	1' 5.6"	2'10.2"	4' 6.9"	6' 2.1"	8' 4.5"	11' 7.1"	14' 4.1"	25' 0.5"	49' 9.6"
	FAR	1' 6.4"	3' 2"	5' 6.2"	8' 1.1"	12' 5.1"	21' 3.7"	33' 2.2"	∞	∞
f/11	NEAR	1' 5.4"	2' 9.5"	4' 5.2"	5'11"	7'10.8"	10' 8.2"	12'11.7"	21' 1.3"	36' 3.2"
	FAR	1' 6.6"	3' 2.8"	5' 8.9"	8' 7.1"	13' 8"	25' 3.9"	44' 1.7"	∞	∞
f/16	NEAR	1' 5.2"	2' 8.5"	4' 2.6"	5' 6.4"	7' 2.6"	9' 5.5"	11' 2.4"	16' 8.9"	24'11.9"
	FAR	1' 6.9"	3' 4.3"	6' 1.9"	9' 7"	16' 5.2"	36'11.8"	98' 8.3"	∞	∞
f/22	NEAR	1' 4.9"	2' 7.4"	3'11.8"	5' 1.6"	6' 6.5"	8' 3.8"	9' 7.5"	13' 5.1"	18' 2.7"
	FAR	1' 7.2"	3' 6.2"	6' 9.1"	11' 1.8"	21' 8.7"	83' 1.2"	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 6"	2'11.8"	4'11.5"	6'11"	9' 9.8"	14' 7.1"	19' 3.3"	45' 7.9"	522' 6.3"
	FAR	1' 6"	3' 0.2"	5' 0.5"	7' 1.1"	10' 2.3"	15' 5.2"	20' 9.4"	55' 3"	∞
f/1.2	NEAR	1' 5.9"	2'11.8"	4'11.3"	6'10.7"	9' 9.3"	14' 5.8"	19' 1.1"	44' 7.7"	413' 8.4"
	FAR	1' 6"	3' 0.2"	5' 0.7"	7' 1.4"	10' 2.9"	15' 6.6"	21'	56' 9.9"	∞
f/1.4	NEAR	1' 5.9"	2'11.7"	4'11.2"	6'10.5"	9' 8.8"	14' 4.9"	18'11.4"	43'10.3"	354' 7.5"
	FAR	1' 6.1"	3' 0.3"	5' 0.8"	7' 1.6"	10' 3.4"	15' 7.8"	21' 2.1"	58' 1.8"	∞
f/1.5	NEAR	1' 5.9"	2'11.7"	4'11.2"	6'10.4"	9' 8.6"	14' 4.4"	18'10.6"	43' 5.8"	331'
	FAR	1' 6.1"	3' 0.3"	5' 0.9"	7' 1.7"	10' 3.6"	15' 8.3"	21' 3.2"	58'10"	∞
f/1.8	NEAR	1' 5.9"	2'11.6"	4'11"	6'10"	9' 7.9"	14' 2.9"	18' 8"	42' 4.5"	275'10.3"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2.1"	10' 4.4"	15'10.1"	21' 6.4"	60'11.9"	∞
f/1.9	NEAR	1' 5.9"	2'11.6"	4'11"	6' 9.9"	9' 7.7"	14' 2.5"	18' 7.2"	42' 0.2"	261' 4.2"
	FAR	1' 6.1"	3' 0.4"	5' 1.1"	7' 2.2"	10' 4.6"	15'10.7"	21' 7.5"	61' 8.9"	∞
f/2	NEAR	1' 5.9"	2'11.6"	4'10.9"	6' 9.8"	9' 7.5"	14' 2"	18' 6.4"	41' 8"	248' 3.5"
	FAR	1' 6.1"	3' 0.4"	5' 1.1"	7' 2.3"	10' 4.9"	15'11.3"	21' 8.6"	62' 6.2"	∞
f/2.8	NEAR	1' 5.9"	2'11.5"	4'10.5"	6' 9"	9' 5.8"	13'10.3"	18' 0.1"	39' 0.8"	177' 4.9"
	FAR	1' 6.1"	3' 0.5"	5' 1.6"	7' 3.3"	10' 6.9"	16' 4.2"	22' 5.9"	69' 5.8"	∞
f/4	NEAR	1' 5.8"	2'11.2"	4' 9.8"	6' 7.8"	9' 3.4"	13' 5"	17' 3.2"	35' 8.7"	124' 2.8"
	FAR	1' 6.2"	3' 0.8"	5' 2.3"	7' 4.8"	10'10.1"	17' 0.1"	23' 9.2"	83' 5.2"	∞
f/5.6	NEAR	1' 5.8"	2'10.9"	4' 9"	6' 6.2"	9' 0.2"	12'10.5"	16' 4.5"	32' 0.8"	88' 9.5"
	FAR	1' 6.2"	3' 1.1"	5' 3.3"	7' 6.8"	11' 2.7"	17'11.7"	25' 8.5"	113'11.8"	∞
f/8	NEAR	1' 5.7"	2'10.5"	4' 7.8"	6' 3.9"	8' 7.9"	12' 1.7"	15' 2.4"	27' 9.7"	62' 2.5"
	FAR	1' 6.3"	3' 1.6"	5' 4.9"	7'10.1"	11'10.2"	19' 7.8"	29' 3.7"	253' 3.5"	∞
f/11	NEAR	1' 5.5"	2'10"	4' 6.4"	6' 1.3"	8' 2.9"	11' 4"	13'11.4"	23'10.3"	45' 3.5"
	FAR	1' 6.5"	3' 2.2"	5' 6.9"	8' 2.6"	12' 8.8"	22' 3"	35' 6.4"	∞	∞
f/16	NEAR	1' 5.3"	2' 9.2"	4' 4.2"	5' 9.3"	7' 7.7"	10' 2.5"	12' 3.3"	19' 3.5"	31' 2.3"
	FAR	1' 6.7"	3' 3.4"	5'10.6"	8'11.1"	14' 6.6"	28' 6.7"	55' 1.1"	∞	∞
f/22	NEAR	1' 5.1"	2' 8.2"	4' 1.8"	5' 5"	7' 0.3"	9' 1.5"	10' 8.8"	15' 3.5"	22' 8.8"
	FAR	1' 7"	3' 4.6"	6' 3.7"	9'11.5"	17' 6.8"	43' 4.7"	163' 6.7"	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 5.9"	2' 11.8"	4' 11.4"	6' 10.8"	9' 9.6"	14' 6.5"	19' 2.3"	45' 2.1"	464' 10.7"
	FAR	1' 6"	3' 0.2"	5' 0.6"	7' 1.2"	10' 2.5"	15' 5.9"	20' 10.6"	55' 11.8"	∞
f/1.2	NEAR	1' 5.9"	2' 11.7"	4' 11.3"	6' 10.5"	9' 8.9"	14' 5.1"	18' 11.9"	44' 0.7"	368' 1"
	FAR	1' 6"	3' 0.2"	5' 0.8"	7' 1.6"	10' 3.2"	15' 7.5"	21' 1.5"	57' 9.6"	∞
f/1.4	NEAR	1' 5.9"	2' 11.7"	4' 11.1"	6' 10.3"	9' 8.4"	14' 4"	18' 9.9"	43' 2.5"	315' 6.3"
	FAR	1' 6.1"	3' 0.3"	5' 0.9"	7' 1.8"	10' 3.8"	15' 8.8"	21' 3.9"	59' 4.1"	∞
f/1.5	NEAR	1' 5.9"	2' 11.7"	4' 11.1"	6' 10.2"	9' 8.2"	14' 3.5"	18' 9.0"	42' 9.5"	294' 6"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2"	10' 4.1"	15' 9.4"	21' 5.2"	60' 1.8"	∞
f/1.8	NEAR	1' 5.9"	2' 11.6"	4' 10.9"	6' 9.1"	9' 7.5"	14' 1.9"	18' 6.2"	41' 7.1"	245' 5.4"
	FAR	1' 6.1"	3' 0.4"	5' 1.2"	7' 2.4"	10' 4.9"	15' 11.4"	21' 8.9"	62' 8.3"	∞
f/1.9	NEAR	1' 5.9"	2' 11.6"	4' 10.8"	6' 9.7"	9' 7.2"	14' 1.4"	18' 5.3"	41' 2.5"	232' 6.5"
	FAR	1' 6.1"	3' 0.4"	5' 1.2"	7' 2.5"	10' 5.2"	16' 0.1"	21' 10.2"	63' 7.1"	∞
f/2	NEAR	1' 5.9"	2' 11.6"	4' 10.8"	6' 9.8"	9' 7"	14' 0.8"	18' 4.4"	40' 10"	220' 11.1"
	FAR	1' 6.1"	3' 0.4"	5' 1.3"	7' 2.6"	10' 5.5"	16' 0.8"	21' 11.4"	64' 6.2"	∞
f/2.8	NEAR	1' 5.9"	2' 11.4"	4' 10.3"	6' 8.6"	9' 5.1"	13' 8.7"	17' 9.5"	38' 0.5"	157' 10.3"
	FAR	1' 6.1"	3' 0.6"	5' 1.8"	7' 3.7"	10' 7.8"	16' 6.4"	22' 10.2"	73'	∞
f/4	NEAR	1' 5.8"	2' 11.1"	4' 9.6"	6' 7.3"	9' 2.4"	13' 3.0"	16' 11.8"	34' 6.1"	110' 6.7"
	FAR	1' 6.2"	3' 0.9"	5' 2.6"	7' 5.4"	10' 11.5"	17' 3.5"	24' 4"	90' 11.6"	∞
f/5.6	NEAR	1' 5.7"	2' 10.8"	4' 8.7"	6' 5.5"	8' 11"	12' 7.9"	16' 0.3"	30' 8.6"	79' 0.3"
	FAR	1' 6.3"	3' 1.2"	5' 3.8"	7' 7.7"	11' 4.7"	18' 5.1"	26' 7.8"	135' 5.8"	∞
f/8	NEAR	1' 5.6"	2' 10.4"	4' 7.4"	6' 3"	8' 6.2"	11' 10.4"	14' 9.2"	26' 4.4"	55' 4.5"
	FAR	1' 6.4"	3' 1.8"	5' 5.5"	7' 11.5"	12' 1.4"	20' 5.2"	31' 1.1"	51' 8"	∞
f/11	NEAR	1' 5.5"	2' 9.8"	4' 5.8"	6' 0.2"	8' 0.9"	11' 0.1"	13' 5.4"	22' 5"	40' 3.9"
	FAR	1' 6.5"	3' 2.5"	5' 7.9"	8' 4.7"	13' 2.1"	23' 7.9"	39' 3.7"	∞	∞
f/16	NEAR	1' 5.3"	2' 8.9"	4' 3.4"	5' 7.8"	7' 5.1"	9' 9.9"	11' 8.7"	17' 11.4"	27' 9.4"
	FAR	1' 6.8"	3' 3.8"	6' 0.2"	9' 2.8"	15' 4.9"	32' 1.9"	70' 5.1"	∞	∞
f/22	NEAR	1' 5"	2' 7.8"	4' 0.8"	5' 3.3"	6' 9.3"	8' 8.5"	10' 1.9"	14' 5.9"	20' 3.1"
	FAR	1' 7.1"	3' 5.5"	6' 6.2"	10' 6"	19' 4.6"	56' 8.6"	1546' 4.3"	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		18 in.	3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	Inf.
f/0.95	NEAR	1' 6"	2' 11.8"	4' 11.5"	6' 11.1"	9' 10"	14' 7.6"	19' 4.2"	46' 0.8"	531' 0.9"
	FAR	1' 6"	3' 0.1"	5' 0.5"	7' 1"	10' 2"	15' 4.6"	20' 8.4"	54' 8.1"	∞
f/1.2	NEAR	1' 5.9"	2' 11.8"	4' 11.4"	6' 10.8"	9' 9.5"	14' 6.5"	19' 2.2"	45' 1.6"	460' 0.7"
	FAR	1' 6"	3' 0.2"	5' 0.6"	7' 1.2"	10' 2.6"	15' 5.9"	20' 10.7"	56' 0.6"	∞
f/1.4	NEAR	1' 5.9"	2' 11.7"	4' 11.3"	6' 10.6"	9' 9.1"	14' 5.6"	19' 0.6"	44' 4.9"	394' 4.3"
	FAR	1' 6"	3' 0.2"	5' 0.7"	7' 1.5"	10' 3"	15' 6.9"	21' 0.6"	57' 2.5"	∞
f/1.5	NEAR	1' 5.9"	2' 11.7"	4' 11.3"	6' 10.5"	9' 8.9"	14' 5.1"	18' 11.9"	44' 0.7"	368' 1"
	FAR	1' 6"	3' 0.2"	5' 0.8"	7' 1.6"	10' 3.2"	15' 7.5"	21' 1.5"	57' 9.6"	∞
f/1.8	NEAR	1' 5.9"	2' 11.7"	4' 11.1"	6' 10.2"	9' 8.4"	14' 3.8"	18' 9.6"	43' 0.5"	306' 9.2"
	FAR	1' 6.1"	3' 0.3"	5' 0.9"	7' 1.9"	10' 3.9"	15' 9"	21' 4.4"	59' 8"	∞
f/1.9	NEAR	1' 5.9"	2' 11.7"	4' 11.1"	6' 10"	9' 8"	14' 3.4"	18' 8.8"	42' 8.5"	290' 7.6"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2"	10' 4.1"	15' 9.5"	21' 5.4"	60' 3.7"	∞
f/2	NEAR	1' 5.9"	2' 11.6"	4' 11"	6' 10"	9' 8"	14' 2.9"	18' 8.1"	42' 4.6"	276' 1.3"
	FAR	1' 6.1"	3' 0.3"	5' 1"	7' 2.1"	10' 4.3"	15' 10.1"	21' 6.4"	60' 11.7"	∞
f/2.8	NEAR	1' 5.9"	2' 11.5"	4' 10.6"	6' 9.3"	9' 6.4"	13' 11.6"	18' 2.3"	39' 11.4"	197' 3.3"
	FAR	1' 6.1"	3' 0.5"	5' 1.4"	7' 2.9"	10' 6.2"	16' 2.4"	22' 2.6"	66' 10.2"	∞
f/4	NEAR	1' 5.8"	2' 11.3"	4' 10.1"	6' 8.2"	9' 4.2"	13' 6.8"	17' 6.2"	36' 9.4"	138' 1.8"
	FAR	1' 6.1"	3' 0.7"	5' 2.1"	7' 4.3"	10' 9"	16' 9.4"	23' 3.9"	78' 1.7"	∞
f/5.6	NEAR	1' 5.8"	2' 11.1"	4' 9.3"	6' 6.7"	9' 1.3"	13' 0.8"	16' 8.2"	33' 3.3"	98' 8.8"
	FAR	1' 6.2"	3' 1"	5' 3"	7' 6.1"	11' 1"	17' 7.4"	24' 11.8"	100' 10.9"	∞
f/8	NEAR	1' 5.7"	2' 10.7"	4' 8.2"	6' 4.7"	8' 9.3"	12' 4.6"	15' 7"	29' 1.4"	69' 2"
	FAR	1' 6.3"	3' 1.4"	5' 4.3"	7' 9"	11' 7.5"	19' 0.6"	27' 11.8"	179' 5.1"	∞
f/11	NEAR	1' 5.6"	2' 10.2"	4' 7"	6' 2.3"	8' 4.7"	11' 7.5"	14' 4.7"	25' 2.2"	50' 4.3"
	FAR	1' 6.4"	3' 2"	5' 6.1"	8' 0.9"	12' 4.6"	21' 2.4"	32' 11.1"	6993' 5.9"	∞
f/16	NEAR	1' 5.4"	2' 9.4"	4' 4.9"	5' 10.5"	7' 9.9"	10' 6.6"	12' 9.3"	20' 6.8"	34' 8.2"
	FAR	1' 6.6"	3' 3"	5' 9.4"	8' 8.1"	13' 10.8"	26' 1.7"	46' 8.8"	∞	∞
f/22	NEAR	1' 5.2"	2' 8.6"	4' 2.7"	5' 6.6"	7' 2.9"	9' 6"	11' 3.1"	16' 10.5"	25' 3.3"
	FAR	1' 6.9"	3' 4.2"	6' 1.7"	9' 6.5"	16' 3.6"	36' 4.2"	94' 4.9"	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
f/1.5	NEAR	2'11.9"	4'11.6"	6'11.3"	9'10.4"	14' 8.4"	19' 5.6"	46' 8.9"	87' 8.4"	708'11.5"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.7"	20' 6.8"	53' 9"	116' 3.9"	∞
f/1.8	NEAR	2'11.8"	4'11.6"	6'11.1"	9'10.1"	14' 7.7"	19' 4.4"	46' 1.7"	85' 7.2"	590'10.2"
	FAR	3' 0.1"	5' 0.5"	7' 0.9"	10' 1.9"	15' 4.5"	20' 8.2"	54' 6.8"	120' 3"	∞
f/1.9	NEAR	2'11.8"	4'11.5"	6'11.1"	9'10"	14' 7.5"	19' 4"	45'11.3"	84'11"	559' 9.2"
	FAR	3' 0.1"	5' 0.5"	7' 1"	10' 2.1"	15' 4.8"	20' 8.6"	54'10.2"	121' 7.5"	∞
f/2	NEAR	2'11.8"	4'11.5"	6'11"	9' 9.9"	14' 7.2"	19' 3.5"	45' 9"	84' 3"	531' 9.5"
	FAR	3' 0.2"	5' 0.5"	7' 1"	10' 2.2"	15' 5"	20' 9.1"	55' 1.5"	123' 0.3"	∞
f/2.8	NEAR	2'11.8"	4'11.3"	6'10.6"	9' 9.1"	14' 5.4"	19' 0.3"	44' 2.9"	79' 3.1"	379'11.2"
	FAR	3' 0.2"	5' 0.7"	7' 1.5"	10' 3.1"	15' 7.1"	21' 0.9"	57' 5.9"	135' 6.1"	∞
f/3.5	NEAR	2'11.7"	4'11.1"	6'10.3"	9' 8.4"	14' 3.9"	18' 9.6"	43' 0.1"	75' 4.3"	304' 0.1"
	FAR	3' 0.3"	5' 0.9"	7' 1.8"	10' 3.8"	15' 9"	21' 4.4"	59' 8.7"	148' 8.7"	∞
f/4	NEAR	2'11.7"	4'11"	6'10"	9' 7.9"	14' 2.7"	18' 7.7"	42' 2"	72' 9.6"	266' 0.5"
	FAR	3' 0.3"	5' 1"	7' 2.1"	10' 4.4"	15'10.3"	21' 6.9"	61' 5.2"	159'10.4"	∞
f/5.6	NEAR	2'11.5"	4'10.6"	6' 9.3"	9' 6.3"	13'11.3"	18' 1.8"	39' 8.2"	65' 8"	190' 1.4"
	FAR	3' 0.5"	5' 1.4"	7' 3"	10' 6.3"	16' 2.8"	22' 3.4"	67' 7.6"	210' 3.8"	∞
f/8	NEAR	2'11.3"	4'10.1"	6' 8.1"	9' 4.1"	13' 6.4"	17' 5.5"	36' 5.6"	57' 3.1"	133' 2"
	FAR	3' 0.7"	5' 2.1"	7' 4.3"	10' 9.2"	16'10"	23' 5.2"	79' 8.5"	399' 8.5"	∞
f/11	NEAR	2'11.1"	4' 9.4"	6' 6.8"	9' 1.4"	13' 0.7"	16' 8"	33' 1.4"	49' 4.4"	96'11.2"
	FAR	3' 0.9"	5' 2.9"	7' 6"	11' 1"	17' 7.7"	25' 0.6"	102' 7.7"	∞	∞
f/16	NEAR	2'10.7"	4' 8.3"	6' 4.6"	8' 9.2"	12' 4"	15' 5.9"	28' 8.7"	40' 2"	66' 8.8"
	FAR	3' 1.4"	5' 4.3"	7' 9.1"	11' 7.9"	19' 2.2"	28' 3.7"	197' 7.8"	∞	∞
f/22	NEAR	2'10.3"	4' 7"	6' 2.2"	8' 4.5"	11' 6.8"	14' 3.5"	24' 9.6"	32'10.1"	48' 7.4"
	FAR	3' 1.9"	5' 6.1"	8' 1"	12' 5.3"	21' 5.2"	33' 6.8"	∞	∞	∞
f/32	NEAR	2' 9.5"	4' 5"	5'10.5"	7' 9.7"	10' 5.9"	12' 8"	20' 2.5"	25' 2.5"	33' 6.2"
	FAR	3' 2.9"	5' 9.3"	8' 8.4"	14' 0.1"	26' 8.2"	48' 8.8"	∞	∞	∞
f/45	NEAR	2' 8.7"	4' 2.6"	5' 6.2"	7' 2.1"	9' 4.3"	11' 0.5"	16' 3.7"	19' 4.7"	23'11"
	FAR	3' 4.2"	6' 2"	9' 7.9"	16' 9.2"	39' 3"	119' 1.4"	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
f/1.5	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.7"	14' 9.1"	19' 6.9"	47' 4.3"	89'11"	886' 1.5"
	FAR	3' 0.1"	5' 0.3"	7' 0.6"	10' 1.3"	15' 3"	20' 5.4"	52'11.5"	112' 7.7"	∞
f/1.8	NEAR	2'11.9"	4'11.6"	6'11.3"	9'10.5"	14' 8.6"	19' 5.9"	46'10.4"	88' 1.6"	738' 5.8"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.6"	20' 6.5"	53' 7.1"	115' 6.8"	∞
f/1.9	NEAR	2'11.9"	4'11.6"	6'11.3"	9'10.4"	14' 8.4"	19' 5.5"	46' 8.4"	87' 6.7"	699' 7.6"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.8"	20' 6.9"	53' 9.6"	116' 6.9"	∞
f/2	NEAR	2'11.9"	4'11.6"	6'11.2"	9'10.3"	14' 8.2"	19' 5.2"	46' 6.5"	86'11.9"	664' 8"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.7"	15' 4"	20' 7.2"	54' 0.2"	117' 7.3"	∞
f/2.8	NEAR	2'11.8"	4'11.4"	6'10.9"	9' 9.7"	14' 6.7"	19' 2.6"	45' 3.4"	82' 8.3"	474'10.1"
	FAR	3' 0.2"	5' 0.6"	7' 1.2"	10' 2.4"	15' 5.6"	20'10.2"	55' 9.8"	126' 6.2"	∞
f/3.5	NEAR	2'11.8"	4'11.3"	6'10.6"	9' 9.1"	14' 5.4"	19' 0.3"	44' 2.9"	79' 3.1"	379'11.2"
	FAR	3' 0.2"	5' 0.7"	7' 1.5"	10' 3.1"	15' 7.1"	21' 0.9"	57' 5.9"	135' 6.1"	∞
f/4	NEAR	2'11.7"	4'11.2"	6'10.4"	9' 8.7"	14' 4.5"	18'10.8"	43' 6.4"	76'11.8"	332' 5.8"
	FAR	3' 0.3"	5' 0.8"	7' 1.7"	10' 3.5"	15' 8.2"	21' 2.9"	58' 9"	142' 9.1"	∞
f/5.6	NEAR	2'11.6"	4'10.9"	6' 9.8"	9' 7.4"	14' 1.7"	18' 5.9"	41' 4.7"	70' 6"	237' 6.8"
	FAR	3' 0.4"	5' 1.1"	7' 2.4"	10' 5"	15'11.7"	21' 9.4"	63' 2.1"	172' 3.1"	∞
f/8	NEAR	2'11.5"	4'10.4"	6' 8.9"	9' 5.6"	13' 9.6"	17'10.9"	38' 6.6"	62' 7.2"	166' 4.7"
	FAR	3' 0.5"	5' 1.6"	7' 3.4"	10' 7.2"	16' 5.1"	22' 7.8"	71' 2.7"	249' 8.9"	∞
f/11	NEAR	2'11.3"	4' 9.9"	6' 7.8"	9' 3.3"	13' 4.9"	17' 2.8"	35' 6.1"	54'11"	121' 1.1"
	FAR	3' 0.7"	5' 2.3"	7' 4.7"	10'10.2"	17' 0.5"	23'10.1"	84' 9"	571' 4.4"	∞
f/16	NEAR	2'11"	4' 9"	6' 6"	8'11.8"	12' 9.5"	16' 2.7"	31' 4.7"	45' 7.2"	83' 4.1"
	FAR	3' 1.1"	5' 3.4"	7' 7.1"	11' 3.4"	18' 2"	26' 1.6"	124' 1.2"	∞	∞
f/22	NEAR	2'10.6"	4' 7.9"	6' 4"	8' 7.9"	12' 1.5"	15' 1.8"	27' 6.7"	37'10.9"	60' 8.3"
	FAR	3' 1.5"	5' 4.8"	7'10.1"	11'10.3"	19' 8.8"	29' 6.5"	281' 0.7"	∞	∞
f/32	NEAR	2'10"	4' 6.3"	6' 0.8"	8' 1.9"	11' 1.9"	13' 7.5"	22'11"	29' 7.3"	41' 9.8"
	FAR	3' 2.2"	5' 7.2"	8' 3.5"	12'11.5"	23' 0.8"	37' 9.5"	∞	∞	∞
f/45	NEAR	2' 9.3"	4' 4.2"	5' 9.1"	7' 7.2"	10' 1.3"	12' 1.4"	18' 9.8"	23' 0.9"	29' 9.9"
	FAR	3' 3.3"	5'10.7"	8'11.7"	14' 9"	29' 7.1"	59' 6.3"	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
1/1.5	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.7"	14' 9.1"	19' 6.8"	47' 4"	89' 9.7"	875' 2.6"
	FAR	3' 0.1"	5' 0.3"	7' 0.6"	10' 1.3"	15' 3"	20' 5.4"	52'11.9"	112' 9.8"	∞
1/1.8	NEAR	2'11.9"	4'11.6"	6'11.3"	9'10.5"	14' 8.5"	19' 5.8"	46'10"	88' 0.2"	729' 4.8"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.6"	20' 6.5"	53' 7.6"	115' 9.4"	∞
1/1.9	NEAR	2'11.9"	4'11.6"	6'11.2"	9'10.4"	14' 8.3"	19' 5.5"	46' 8"	87' 5.2"	691' 0.4"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.8"	20' 6.9"	53'10.2"	116' 9.7"	∞
1/2	NEAR	2'11.9"	4'11.6"	6'11.2"	9'10.3"	14' 8.1"	19' 5.1"	46' 6.1"	86'10.3"	656' 6"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.7"	15' 4"	20' 7.3"	54' 0.8"	117'10.2"	∞
1/2.8	NEAR	2'11.8"	4'11.4"	6'10.9"	9' 9.7"	14' 6.7"	19' 2.5"	45' 2.9"	82' 6.3"	469' 0.2"
	FAR	3' 0.2"	5' 0.6"	7' 1.2"	10' 2.4"	15' 5.7"	20'10.3"	55'10.7"	126'11.1"	∞
1/3.5	NEAR	2'11.8"	4'11.3"	6'10.8"	9' 9.1"	14' 5.4"	19' 0.2"	44' 2.3"	79' 0.8"	375' 3.4"
	FAR	3' 0.2"	5' 0.7"	7' 1.5"	10' 3.1"	15' 7.2"	21' 1.1"	57' 7"	136' 1.1"	∞
1/4	NEAR	2'11.7"	4'11.2"	6'10.4"	9' 8.7"	14' 4.5"	18'10.6"	43' 5.6"	76' 9.3"	328' 4.9"
	FAR	3' 0.2"	5' 0.8"	7' 1.7"	10' 3.5"	15' 8.2"	21' 3.1"	58'10.3"	143' 5.9"	∞
1/5.6	NEAR	2'11.6"	4'10.9"	6' 9.8"	9' 7.4"	14' 1.6"	18' 5.7"	41' 3.8"	70' 3.1"	234' 8.1"
	FAR	3' 0.4"	5' 1.1"	7' 2.4"	10' 5"	15'11.8"	21' 9.6"	63' 4.3"	173' 9.2"	∞
1/8	NEAR	2'11.5"	4'10.4"	6' 8.9"	9' 5.5"	13' 9.5"	17'10.7"	38' 5.5"	62' 3.9"	164' 4.4"
	FAR	3' 0.5"	5' 1.6"	7' 3.4"	10' 7.3"	16' 5.3"	22' 8.2"	71' 6.9"	254' 4"	∞
1/11	NEAR	2'11.3"	4' 9.9"	6' 7.8"	9' 3.3"	13' 4.7"	17' 2.6"	35' 4.8"	54' 7.6"	119' 7.6"
	FAR	3' 0.7"	5' 2.3"	7' 4.8"	10'10.2"	17' 0.7"	23'10.6"	85' 5.2"	606' 0.6"	∞
1/16	NEAR	2'11"	4' 9"	6' 6"	8'11.8"	12' 9.3"	16' 2.3"	31' 3.2"	45' 3.9"	82' 4.2"
	FAR	3' 1.1"	5' 3.4"	7' 7.1"	11' 3.5"	18' 2.4"	26' 2.5"	126' 3.3"	∞	∞
1/22	NEAR	2'10.6"	4' 7.9"	6' 4"	8' 7.8"	12' 1.2"	15' 1.5"	27' 5.2"	37' 7.7"	59'11.8"
	FAR	3' 1.5"	5' 4.8"	7'10.1"	11'10.5"	19' 9.4"	29' 8.2"	297' 2.8"	∞	∞
1/32	NEAR	2'10"	4' 6.3"	6' 0.8"	8' 1.9"	11' 1.6"	13' 7.5"	22' 9.5"	29' 4.6"	41' 4.1"
	FAR	3' 2.2"	5' 7.2"	8' 3.6"	12'11.8"	23' 2.1"	38' 1.6"	∞	∞	∞
1/45	NEAR	2' 9.3"	4' 4.3"	5' 9.1"	7' 7.1"	10' 1.1"	12' 0.9"	18' 8.4"	22'10.7"	29' 5.9"
	FAR	3' 3.2"	5'10.7"	8'11.8"	14' 9.6"	29'10.3"	60' 9.3"	∞	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
1/1.5	NEAR	2'11.9"	4'11.8"	6'11.5"	9'11"	14' 9.7"	19' 7.8"	47'10.1"	91' 8.1"	1093'11.3"
	FAR	3' 0.1"	5' 0.2"	7' 0.5"	10' 1"	15' 2.4"	20' 4.3"	52' 4.4"	109'11.9"	∞
1/1.8	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.8"	14' 9.2"	19' 7"	47' 5.2"	90' 2.1"	911' 8.1"
	FAR	3' 0.1"	5' 0.3"	7' 0.6"	10' 1.2"	15' 2.9"	20' 5.2"	52'10.4"	112' 2.9"	∞
1/1.9	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.7"	14' 9.1"	19' 6.7"	47' 3.6"	89' 8.2"	863' 8.5"
	FAR	3' 0.1"	5' 0.3"	7' 0.6"	10' 1.3"	15' 3"	20' 5.5"	53' 0.4"	113' 0.1"	∞
1/2	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.6"	14' 8.9"	19' 6.5"	47' 2"	89' 2.4"	820' 6.5"
	FAR	3' 0.1"	5' 0.3"	7' 0.7"	10' 1.4"	15' 3.2"	20' 5.8"	53' 2.4"	113' 9.5"	∞
1/2.8	NEAR	2'11.8"	4'11.6"	6'11.1"	9'10.1"	14' 7.7"	19' 4.3"	46' 1.4"	85' 6.1"	586' 2.3"
	FAR	3' 0.1"	5' 0.5"	7' 0.9"	10' 1.9"	15' 4.5"	20' 8.2"	54' 7.2"	120' 5.2"	∞
1/3.5	NEAR	2'11.8"	4'11.4"	6'10.9"	9' 9.7"	14' 6.7"	19' 2.5"	45' 2.9"	82' 6.3"	469' 0.2"
	FAR	3' 0.2"	5' 0.6"	7' 1.2"	10' 2.4"	15' 5.7"	20'10.3"	55'10.7"	126'11.1"	∞
1/4	NEAR	2'11.8"	4'11.4"	6'10.7"	9' 9.3"	14' 5.9"	19' 1.2"	44' 7.6"	80' 6.1"	410' 5.2"
	FAR	3' 0.2"	5' 0.6"	7' 1.3"	10' 2.8"	15' 6.5"	20'11.9"	56'10.1"	132'	∞
1/5.6	NEAR	2'11.7"	4'11.1"	6'10.2"	9' 8.3"	14' 3.6"	18' 9.1"	42' 9.6"	74' 8.4"	293' 3.1"
	FAR	3' 0.3"	5' 0.9"	7' 1.9"	10' 4"	15' 9.3"	21' 5"	60' 1.7"	151' 4.9"	∞
1/8	NEAR	2'11.6"	4'10.8"	6' 9.5"	9' 6.8"	14' 0.2"	18' 3.3"	40' 3.8"	67' 4.8"	205' 4.6"
	FAR	3' 0.4"	5' 1.3"	7' 2.7"	10' 5.7"	16' 1.6"	22' 1.1"	65'10.5"	194' 3.3"	∞
1/11	NEAR	2'11.4"	4'10.3"	6' 8.6"	9' 4.9"	13' 8.2"	17' 8.5"	37' 7.1"	60' 0.8"	149' 5.5"
	FAR	3' 0.6"	5' 1.8"	7' 3.8"	10' 6"	16' 7.2"	22'11.9"	74' 9.7"	300'10.4"	∞
1/16	NEAR	2'11.2"	4' 9.6"	6' 7.1"	9' 2"	13' 2"	16'10"	33' 9.5"	50'10.4"	102'10.3"
	FAR	3' 0.8"	5' 2.7"	7' 5.6"	11' 0.1"	17' 5.4"	24' 8"	96' 8.2"	358' 0.6"	∞
1/22	NEAR	2'10.9"	4' 8.7"	6' 5.4"	8'10.7"	12' 7.1"	15'10.7"	30' 1.7"	42'11.8"	74'10.7"
	FAR	3' 1.2"	5' 3.7"	7' 7.9"	11' 5.3"	18' 7.1"	27' 0.6"	149' 1.4"	∞	∞
1/32	NEAR	2'10.4"	4' 7.3"	6' 2.8"	8' 5.6"	11' 8.8"	14' 6.5"	25' 6.7"	34' 2.2"	51' 7.1"
	FAR	3' 1.7"	5' 5.6"	8'	12' 3"	20'10.6"	32' 3"	160' 7"	∞	∞
1/45	NEAR	2' 9.8"	4' 5.6"	5'11.6"	7'11.7"	10' 9.5"	13' 1.3"	21' 4.2"	27' 0.2"	36' 9.4"
	FAR	3' 2.5"	5' 8.2"	8' 6"	13' 5.9"	24'10.6"	43' 0.7"	∞	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
f/1.5	NEAR	2'11.9"	4'11.8"	6'11.7"	9'11.3"	14'10.4"	19' 9.2"	48' 6.1"	94' 1.8"	1594' 11.2"
	FAR	3'	5' 0.2"	7' 0.3"	10' 0.7"	15' 1.6"	20' 2.9"	51' 7.1"	106' 7.6"	∞
f/1.8	NEAR	2'11.9"	4'11.8"	6'11.6"	9'11.2"	14'10.1"	19' 8.6"	48' 2.6"	93' 0.7"	1329' 2.2"
	FAR	3'	5' 0.2"	7' 0.4"	10' 0.8"	15' 1.9"	20' 3.5"	51' 11"	108' 0.8"	∞
f/1.9	NEAR	2'11.9"	4'11.8"	6'11.6"	9'11.1"	14'10"	19' 8.4"	48' 1.5"	92' 8.4"	1259' 3"
	FAR	3'	5' 0.2"	7' 0.4"	10' 0.9"	15' 2"	20' 3.7"	52' 0.4"	108' 6.6"	∞
f/2	NEAR	2'11.9"	4'11.8"	6'11.6"	9'11.1"	14' 9.9"	19' 8.2"	48' 0.3"	92' 4.2"	1196' 3.7"
	FAR	3'	5' 0.2"	7' 0.4"	10' 0.9"	15' 2.2"	20' 3.9"	52' 1.7"	109' 0.5"	∞
f/2.8	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.7"	14' 9.1"	19' 6.7"	47' 3.4"	89' 7.3"	854' 7.6"
	FAR	3' 0.1"	5' 0.3"	7' 0.6"	10' 1.3"	15' 3"	20' 5.5"	53' 0.6"	113' 1.6"	∞
f/3.5	NEAR	2'11.9"	4'11.6"	6'11.3"	9'10.4"	14' 8.4"	19' 5.5"	46' 7.8"	87' 4.1"	683' 9.5"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.8"	20' 6.9"	53' 10.5"	116' 11.7"	∞
f/4	NEAR	2'11.9"	4'11.6"	6'11.2"	9'10.2"	14' 7.8"	19' 4.6"	46' 2.5"	85' 9.5"	598' 4.5"
	FAR	3' 0.1"	5' 0.4"	7' 0.9"	10' 1.9"	15' 4.4"	20' 7.9"	54' 5.7"	119' 10.7"	∞
f/5.6	NEAR	2'11.8"	4'11.4"	6'10.8"	9' 9.5"	14' 6.2"	19' 1.7"	44' 10.2"	81' 2.2"	427' 6.5"
	FAR	3' 0.2"	5' 0.6"	7' 1.2"	10' 2.6"	15' 6.2"	20' 11.3"	56' 6.1"	130' 3.1"	∞
f/8	NEAR	2'11.7"	4'11.2"	6'10.3"	9' 8.4"	14' 3.9"	18' 9.6"	42' 11.4"	75' 1.6"	299' 4.9"
	FAR	3' 0.2"	5' 0.8"	7' 1.8"	10' 3.8"	15' 8.9"	21' 4.4"	59' 10.2"	149' 8.5"	∞
f/11	NEAR	2'11.6"	4'10.9"	6' 9.7"	9' 7.2"	14' 1"	18' 4.6"	40' 9.6"	68' 8.8"	217' 10.5"
	FAR	3' 0.3"	5' 1.2"	7' 2.5"	10' 5.3"	16' 0.5"	21' 11.2"	64' 7.6"	184' 1"	∞
f/16	NEAR	2'11.5"	4'10.4"	6' 8.7"	9' 5.1"	13' 8.5"	17' 8.8"	37' 7.9"	60' 2.4"	149' 11.1"
	FAR	3' 0.5"	5' 1.7"	7' 3.6"	10' 7.8"	16' 6.8"	22' 11.3"	74' 6.9"	298' 6.3"	∞
f/22	NEAR	2'11.3"	4' 9.8"	6' 7.5"	9' 2.7"	13' 3.4"	17' 0.2"	34' 5.8"	52' 4.9"	109' 1.9"
	FAR	3' 0.7"	5' 2.4"	7' 5.1"	10' 11.1"	17' 3"	24' 3.5"	91' 6.2"	1182' 3.5"	∞
f/32	NEAR	2'11"	4' 8.9"	6' 5.7"	9' 11"	12' 7.5"	15' 11.3"	30' 2.9"	43' 1.6"	75' 2.2"
	FAR	3' 1.1"	5' 3.6"	7' 7.6"	11' 4.8"	18' 6.3"	26' 11.2"	147' 6.2"	∞	∞
f/45	NEAR	2'10.6"	4' 7.7"	6' 3.4"	8' 6.5"	11' 10.4"	14' 8.9"	26' 1.1"	35' 1.1"	53' 7.1"
	FAR	3' 1.5"	5' 5.1"	7' 11.1"	12' 1.1"	20' 5.9"	31' 4.6"	733' 7.4"	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
f/1.5	NEAR	2'11.9"	4'11.9"	6'11.8"	9'11.5"	14'10.7"	19' 9.7"	48' 9.6"	95' 3.2"	1993' 6.6"
	FAR	3'	5' 0.1"	7' 0.3"	10' 0.6"	15' 1.3"	20' 2.3"	51' 3.2"	105' 2.8"	∞
f/1.8	NEAR	2'11.9"	4'11.9"	6'11.7"	9'11.3"	14'10.5"	19' 9.3"	48' 6.8"	94' 4.4"	1661' 4.4"
	FAR	3'	5' 0.2"	7' 0.3"	10' 0.7"	15' 1.5"	20' 2.8"	51' 6.3"	106' 4.2"	∞
f/1.9	NEAR	2'11.9"	4'11.8"	6'11.7"	9'11.3"	14'10.4"	19' 9.1"	48' 5.8"	94' 0.9"	1573' 11.4"
	FAR	3'	5' 0.2"	7' 0.3"	10' 0.7"	15' 1.6"	20' 3"	51' 7.3"	106' 8.7"	∞
f/2	NEAR	2'11.9"	4'11.8"	6'11.7"	9'11.3"	14'10.3"	19' 9"	48' 4.9"	93' 9.4"	1495' 3.3"
	FAR	3'	5' 0.2"	7' 0.4"	10' 0.7"	15' 1.7"	20' 3.1"	51' 8.4"	107' 1.2"	∞
f/2.8	NEAR	2'11.9"	4'11.8"	6'11.5"	9'11"	14' 9.7"	19' 7.8"	47' 9.6"	91' 6.1"	1068' 2.2"
	FAR	3' 0.1"	5' 0.3"	7' 0.5"	10' 1"	15' 2.4"	20' 4.4"	52' 4.9"	110' 2.8"	∞
f/3.5	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.7"	14' 9.1"	19' 6.7"	47' 3.4"	89' 7.3"	854' 7.6"
	FAR	3' 0.1"	5' 0.3"	7' 0.6"	10' 1.3"	15' 3"	20' 5.5"	53' 0.6"	113' 1.6"	∞
f/4	NEAR	2'11.9"	4'11.7"	6'11.3"	9'10.6"	14' 8.7"	19' 6"	46' 11"	88' 3.6"	747' 10.3"
	FAR	3' 0.1"	5' 0.3"	7' 0.7"	10' 1.5"	15' 3.5"	20' 6.3"	53' 6.2"	115' 3.6"	∞
f/5.6	NEAR	2'11.8"	4'11.5"	6'11.1"	9'10"	14' 7.4"	19' 3.7"	45' 9.5"	84' 4.2"	534' 3.7"
	FAR	3' 0.1"	5' 0.5"	7' 1"	10' 2.1"	15' 4.9"	20' 8.9"	55' 0.9"	122' 9.9"	∞
f/8	NEAR	2'11.8"	4'11.3"	6'10.7"	9' 9.1"	14' 5.5"	19' 0.3"	44' 2.4"	79' 0.7"	374' 1.8"
	FAR	3' 0.2"	5' 0.7"	7' 1.4"	10' 3"	15' 7.1"	21' 1"	57' 6.9"	136' 1.8"	∞
f/11	NEAR	2'11.7"	4'11.1"	6'10.2"	9' 8.1"	14' 3.1"	18' 8.2"	42' 4.3"	73' 3.7"	272' 2.8"
	FAR	3' 0.3"	5' 0.9"	7' 2"	10' 4.2"	15' 9.9"	21' 6.2"	61' 0.6"	157' 6.6"	∞
f/16	NEAR	2'11.6"	4'10.7"	6' 9.3"	9' 6.4"	13' 11.4"	18' 1.8"	39' 7.3"	65' 4.7"	187' 3.6"
	FAR	3' 0.4"	5' 1.4"	7' 2.9"	10' 6.2"	16' 2.8"	22' 3.4"	67' 10.7"	213' 6.5"	∞
f/22	NEAR	2'11.4"	4'10.2"	6' 8.4"	9' 4.5"	13' 7.1"	17' 6.5"	36' 9.1"	57' 10.8"	136' 4"
	FAR	3' 0.6"	5' 1.9"	7' 4"	10' 8.7"	16' 9"	23' 3.5"	78' 5.3"	372' 9.2"	∞
f/32	NEAR	2'11.2"	4' 9.5"	6' 6.9"	9' 1.4"	13' 0.5"	16' 7.4"	32' 9.9"	48' 7.7"	93' 10.4"
	FAR	3' 0.8"	5' 2.8"	7' 6"	11' 1.1"	17' 8.2"	25' 2.1"	105' 11.8"	∞	∞
f/45	NEAR	2'10.8"	4' 8.5"	6' 4.9"	8' 9.6"	12' 4.6"	15' 6.6"	28' 9.9"	40' 3.5"	66' 10.6"
	FAR	3' 1.2"	5' 4"	7' 8.6"	11' 7.3"	19' 1"	28' 1.9"	195' 5.9"	∞	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
f/1.5	NEAR	3'	4'11.9"	6'11.8"	9'11.6"	14'11.1"	19'10.4"	49' 1.8"	96' 7.6"	2835' 2.8"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.4"	15' 0.9"	20' 1.6"	50'10.5"	103' 7.4"	∞
f/1.8	NEAR	3'	4'11.9"	6'11.8"	9'11.6"	14'11.1"	19'10.1"	48'11.9"	95'11.8"	2362' 9.5"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.5"	15' 1.1"	20' 1.9"	51' 0.7"	104' 4.4"	∞
f/1.9	NEAR	3'	4'11.9"	6'11.8"	9'11.5"	14'10.9"	19'10"	48'11.2"	95' 9.3"	2238' 5.6"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.5"	15' 1.1"	20' 2"	51' 1.4"	104' 7.5"	∞
f/2	NEAR	3'	4'11.9"	6'11.8"	9'11.5"	14'10.8"	19' 9.9"	48'10.5"	95' 6.7"	2126' 6.9"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.5"	15' 1.2"	20' 2.1"	51' 2.1"	104'10.5"	∞
f/2.8	NEAR	2'11.9"	4'11.8"	6'11.7"	9'11.3"	14'10.4"	19' 9.1"	48' 5.3"	93'10.7"	1519' 1.8"
	FAR	3'	5' 0.2"	7' 0.3"	10' 0.7"	15' 1.7"	20' 3"	51' 7.9"	106'11.6"	∞
f/3.5	NEAR	2'11.9"	4'11.8"	6'11.6"	9'11.1"	14'10"	19' 8.3"	48' 0.8"	92' 5.8"	1215' 5.3"
	FAR	3'	5' 0.2"	7' 0.4"	10' 0.9"	15' 2.1"	20' 3.8"	52' 1.1"	108'10.3"	∞
f/4	NEAR	2'11.9"	4'11.8"	6'11.6"	9'11"	14' 9.7"	19' 7.8"	47' 9.7"	91' 6"	1063' 7"
	FAR	3'	5' 0.2"	7' 0.5"	10' 1"	15' 2.4"	20' 4.3"	52' 4.9"	110' 3.1"	∞
f/5.6	NEAR	2'11.9"	4'11.7"	6'11.4"	9'10.6"	14' 8.8"	19' 6.2"	46'11.8"	88' 5.9"	759'10.4"
	FAR	3' 0.1"	5' 0.3"	7' 0.7"	10' 1.4"	15' 3.3"	20' 6.1"	53' 5.9"	114'11.7"	∞
f/8	NEAR	2'11.9"	4'11.6"	6'11.1"	9'10"	14' 7.4"	19' 3.8"	45' 9.6"	84' 4"	532' 1"
	FAR	3' 0.1"	5' 0.4"	7' 1"	10' 2"	15' 4.8"	20' 8.8"	55' 0.8"	122'10.5"	∞
f/11	NEAR	2'11.8"	4'11.4"	6'10.8"	9' 9.3"	14' 5.8"	19' 0.9"	44' 4.8"	79' 8"	387' 1.6"
	FAR	3' 0.2"	5' 0.6"	7' 1.3"	10' 2.8"	15' 6.7"	21' 0.3"	57' 2.9"	134' 5"	∞
f/16	NEAR	2'11.7"	4'11.1"	6'10.2"	9' 8.1"	14' 3.1"	18' 8.1"	42' 3"	72'11.2"	266' 4.1"
	FAR	3' 0.2"	5' 0.9"	7' 1.9"	10' 4.1"	15' 9.9"	21' 6.4"	61' 3.4"	159' 4.9"	∞
f/22	NEAR	2'11.6"	4'10.8"	6' 9.5"	9' 6.8"	14'	18' 2.7"	39'11.3"	66' 2.8"	193'10.3"
	FAR	3' 0.3"	5' 1.2"	7' 2.7"	10' 5.8"	16' 1.9"	22' 2"	66'11.6"	205' 3.4"	∞
f/32	NEAR	2'11.5"	4'10.3"	6' 8.5"	9' 4.5"	13' 7.1"	17' 6.3"	36' 7.3"	57' 5.5"	133' 5.6"
	FAR	3' 0.5"	5' 1.8"	7' 3.9"	10' 8.6"	16' 9"	23' 3.8"	79' 3"	395' 3.7"	∞
f/45	NEAR	2'11.3"	4' 9.6"	6' 7.1"	9' 1.8"	13' 1.1"	16' 8.3"	33' 0.4"	49' 0.4"	95' 0.9"
	FAR	3' 0.7"	5' 2.6"	7' 5.6"	11' 0.5"	17' 7.1"	25' 0.2"	104' 1.9"	∞	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		3 ft.	5 ft.	7 ft.	10 ft.	15 ft.	20 ft.	50 ft.	100 ft.	Inf.
f/1.5	NEAR	3'	4'11.9"	6'11.9"	9'11.7"	14'11.3"	19'10.7"	49' 3.8"	97' 3.4"	3543'10.8"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.3"	15' 0.7"	20' 1.3"	50' 8.4"	102'10.4"	∞
f/1.8	NEAR	3'	4'11.9"	6'11.8"	9'11.6"	14'11.2"	19'10.5"	49' 2.2"	96' 9.1"	2953' 4.2"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.4"	15' 0.8"	20' 1.5"	50'10.1"	103' 5.6"	∞
f/1.9	NEAR	3'	4'11.9"	6'11.8"	9'11.6"	14'11.1"	19'10.4"	49' 1.7"	96' 7.1"	2797'11.3"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.4"	15' 0.9"	20' 1.6"	50'10.7"	103' 8"	∞
f/2	NEAR	3'	4'11.9"	6'11.8"	9'11.6"	14'11.1"	19'10.3"	49' 1.2"	96' 5"	2658' 0.9"
	FAR	3'	5' 0.1"	7' 0.2"	10' 0.4"	15' 0.9"	20' 1.7"	50'11.2"	103'10.4"	∞
f/2.8	NEAR	2'11.9"	4'11.9"	6'11.8"	9'11.4"	14'10.7"	19' 9.6"	48' 9"	95' 0.6"	1898' 9.5"
	FAR	3'	5' 0.1"	7' 0.3"	10' 0.6"	15' 1.3"	20' 2.4"	51' 3.8"	105' 5.9"	∞
f/3.5	NEAR	2'11.9"	4'11.8"	6'11.7"	9'11.3"	14'10.4"	19' 9.1"	48' 5.3"	93'10.7"	1519' 1.8"
	FAR	3'	5' 0.2"	7' 0.3"	10' 0.7"	15' 1.7"	20' 3"	51' 7.9"	106'11.6"	∞
f/4	NEAR	2'11.9"	4'11.8"	6'11.6"	9'11.2"	14'10.1"	19' 8.6"	48' 2.7"	93' 1"	1329' 4"
	FAR	3'	5' 0.2"	7' 0.4"	10' 0.8"	15' 1.9"	20' 3.5"	51'10.9"	108' 0.5"	∞
f/5.6	NEAR	2'11.9"	4'11.8"	6'11.5"	9'10.9"	14' 9.4"	19' 7.3"	47' 6.7"	90' 6.9"	949' 8.3"
	FAR	3' 0.1"	5' 0.2"	7' 0.5"	10' 1.1"	15' 2.7"	20' 4.9"	52' 8.6"	111' 7.6"	∞
f/8	NEAR	2'11.9"	4'11.7"	6'11.3"	9'10.4"	14' 8.3"	19' 5.4"	46' 7"	87' 0.7"	664'11.5"
	FAR	3' 0.1"	5' 0.4"	7' 0.8"	10' 1.6"	15' 3.8"	20' 7"	53'11.6"	117' 5.9"	∞
f/11	NEAR	2'11.8"	4'11.5"	6'11"	9' 9.8"	14' 7"	19' 3"	45' 5"	83' 0.4"	483' 9.2"
	FAR	3' 0.1"	5' 0.5"	7' 1.1"	10' 2.2"	15' 5.3"	20' 9.7"	55' 8.5"	125' 9"	∞
f/16	NEAR	2'11.8"	4'11.3"	6'10.6"	9' 8.9"	14' 4.8"	18'11.1"	43' 7.2"	77' 1.2"	332' 9.3"
	FAR	3' 0.2"	5' 0.7"	7' 1.5"	10' 3.3"	15' 7.8"	21' 2.5"	58' 7.6"	142' 5.4"	∞
f/22	NEAR	2'11.7"	4'11.1"	6'10"	9' 7.8"	14' 2.3"	18' 6.7"	41' 7.3"	71' 0.2"	242' 2.2"
	FAR	3' 0.3"	5' 1"	7' 2.1"	10' 4.6"	15'11"	21' 8.3"	62' 8.4"	169' 6.1"	∞
f/32	NEAR	2'11.6"	4'10.6"	6' 9.2"	9' 5.9"	13'10.2"	17'11.6"	38' 8.1"	62' 9.3"	166' 8.2"
	FAR	3' 0.4"	5' 1.4"	7' 3.1"	10' 6.8"	16' 4.4"	22' 6.8"	70'11.1"	248' 2.4"	∞
f/45	NEAR	2'11.4"	4'10.1"	6' 8.1"	9' 3.7"	13' 5.2"	17' 3.1"	35' 5.1"	54' 6.8"	118' 8.4"
	FAR	3' 0.6"	5' 2.1"	7' 4.4"	10' 9.8"	17'	23' 9.8"	85' 6.4"	628' 5.3"	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		7 ft.	10 ft.	15 ft.	20 ft.	30 ft.	50 ft.	100 ft.	200 ft.	Inf.
1/1.9	NEAR	6'11.9"	9'11.8"	14'11.6"	19'11.3"	29'10.4"	49' 7.4"	98' 5.4"	193' 9.9"	6217' 3.7"
	FAR	7' 0.1"	10' 0.2"	15' 0.4"	20' 0.7"	30' 1.6"	50' 7.4"	101' 7.2"	206' 7"	∞
1/2	NEAR	6'11.9"	9'11.8"	14'11.6"	19'11.3"	29'10.3"	49' 7.2"	98' 4.4"	193' 6.1"	5906' 6"
	FAR	7' 0.1"	10' 0.2"	15' 0.4"	20' 0.7"	30' 1.7"	50' 4.9"	101' 8.3"	206'11.3"	∞
1/2.5	NEAR	6'11.9"	9'11.8"	14'11.5"	19'11.1"	29' 9.9"	49' 6"	97'11.6"	191'11.5"	4725' 4.7"
	FAR	7' 0.1"	10' 0.2"	15' 0.5"	20' 0.9"	30' 2.2"	50' 6.2"	102' 1.4"	208' 9"	∞
1/2.8	NEAR	6'11.9"	9'11.8"	14'11.4"	19'11"	29' 9.6"	49' 5.2"	97' 8.7"	191' 0.4"	4219' 2.5"
	FAR	7' 0.1"	10' 0.2"	15' 0.6"	20' 1"	30' 2.4"	50' 6.9"	102' 4.6"	209'10.3"	∞
1/3.5	NEAR	6'11.9"	9'11.7"	14'11.3"	19'10.7"	29' 9"	49' 3.6"	97' 2.1"	188'11"	3375' 6.7"
	FAR	7' 0.1"	10' 0.3"	15' 0.7"	20' 1.3"	30' 3"	50' 8.7"	102'11.9"	212' 5.7"	∞
1/4	NEAR	6'11.9"	9'11.7"	14'11.2"	19'10.5"	29' 8.6"	49' 2.4"	96' 9.4"	187' 5.2"	2953' 8.9"
	FAR	7' 0.2"	10' 0.3"	15' 0.8"	20' 1.5"	30' 3.5"	50' 9.9"	103' 5.2"	214' 4.6"	∞
1/5.6	NEAR	6'11.8"	9'11.5"	14'10.9"	19'10"	29' 7.3"	48'10.6"	95' 6.7"	182'10.1"	2110' 1.1"
	FAR	7' 0.2"	10' 0.5"	15' 1.1"	20' 2.1"	30' 4.9"	51' 2"	104'10.5"	220' 8.8"	∞
1/6.3	NEAR	6'11.8"	9'11.5"	14'10.8"	19' 9.7"	29' 6.7"	48' 9"	95' 0.4"	180'10.8"	1875' 9"
	FAR	7' 0.2"	10' 0.5"	15' 1.3"	20' 2.3"	30' 5.5"	51' 3.8"	105' 6.3"	223' 7.6"	∞
1/8	NEAR	6'11.7"	9'11.3"	14'10.4"	19' 9.1"	29' 5.3"	48' 5.1"	93' 9.3"	176' 4.3"	1477' 4.3"
	FAR	7' 0.3"	10' 0.7"	15' 1.6"	20' 3"	30' 7"	51' 8.2"	107' 1.4"	231' 0.1"	∞
1/11	NEAR	6'11.6"	9'11.1"	14' 9.8"	19' 8"	29' 2.8"	47'10.3"	91' 7.7"	168'10.6"	1074' 8.6"
	FAR	7' 0.4"	10' 0.9"	15' 2.2"	20' 4.1"	30' 9.7"	52' 4.1"	110' 0.7"	245' 3.4"	∞
1/16	NEAR	6'11.4"	9'10.7"	14' 8.9"	19' 6.3"	28'10.8"	46'11.4"	88' 3.5"	157' 8.9"	739' 2.1"
	FAR	7' 0.6"	10' 1.3"	15' 3.3"	20' 6"	31' 2.2"	53' 5.8"	115' 4.1"	273' 5.5"	∞
1/22	NEAR	6'11.2"	9'10.2"	14' 7.7"	19' 4.2"	28' 6.1"	45'10.8"	84' 7"	146' 2.1"	537'10.2"
	FAR	7' 0.8"	10' 1.8"	15' 4.5"	20' 8.4"	31' 7.9"	54'11.1"	122' 4.7"	317' 2.8"	∞
1/32	NEAR	6'10.9"	9' 9.4"	14' 5.8"	19' 0.8"	27'10.6"	44' 3"	79' 0.7"	130' 3.4"	370' 0.9"
	FAR	7' 1.2"	10' 2.7"	15' 6.6"	21' 0.4"	32' 5.7"	57' 6.1"	136' 3.6"	432'10.5"	∞
1/45	NEAR	6'10.4"	9' 8.4"	14' 3.5"	18' 8.6"	27' 1.3"	42' 3.4"	72'10.5"	114' 2.1"	263' 5.4"
	FAR	7' 1.7"	10' 3.8"	15' 9.5"	21' 5.8"	33' 7.3"	61' 3.1"	159'11.8"	824' 2.6"	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		7 ft.	10 ft.	15 ft.	20 ft.	30 ft.	50 ft.	100 ft.	200 ft.	Inf.
1/1.9	NEAR	7'	9'11.9"	14'11.7"	19'11.4"	29'10.7"	49' 8.3"	98' 9"	195' 0.4"	7771' 4.7"
	FAR	7' 0.1"	10' 0.1"	15' 0.3"	20' 0.6"	30' 1.3"	50' 3.7"	101' 3.3"	206' 2.8"	∞
1/2	NEAR	7'	9'11.9"	14'11.7"	19'11.4"	29'10.6"	49' 8.1"	98' 8.3"	194' 9.3"	7382'10.5"
	FAR	7' 0.1"	10' 0.1"	15' 0.3"	20' 0.6"	30' 1.4"	50' 3.9"	101' 4.2"	205' 6.2"	∞
1/2.5	NEAR	6'11.9"	9'11.8"	14'11.6"	19'11.3"	29'10.3"	49' 7.2"	98' 4.4"	193' 6.1"	5906' 6"
	FAR	7' 0.1"	10' 0.2"	15' 0.4"	20' 0.7"	30' 1.7"	50' 4.9"	101' 8.3"	206'11.3"	∞
1/2.8	NEAR	6'11.9"	9'11.8"	14'11.6"	19'11.2"	29'10.1"	49' 6.6"	98' 2.1"	192' 9.1"	5273' 9.2"
	FAR	7' 0.1"	10' 0.2"	15' 0.4"	20' 0.8"	30' 1.9"	50' 5.5"	101'10.7"	207' 9.7"	∞
1/3.5	NEAR	6'11.9"	9'11.8"	14'11.4"	19'11"	29' 9.6"	49' 5.2"	97' 8.7"	191' 0.4"	4219' 2.5"
	FAR	7' 0.1"	10' 0.2"	15' 0.6"	20' 1"	30' 2.4"	50' 6.9"	102' 4.6"	209'10.3"	∞
1/4	NEAR	6'11.9"	9'11.7"	14'11.4"	19'10.8"	29' 9.3"	49' 4.3"	97' 5"	189' 9.8"	3691'11.1"
	FAR	7' 0.1"	10' 0.3"	15' 0.6"	20' 1.2"	30' 2.8"	50' 7.9"	102' 8.8"	211' 4.1"	∞
1/5.6	NEAR	6'11.9"	9'11.6"	14'11.1"	19'10.4"	29' 8.2"	49' 1.3"	96' 5"	186' 0.4"	2637' 4.5"
	FAR	7' 0.2"	10' 0.4"	15' 0.9"	20' 1.7"	30' 3.9"	50'11.1"	103'10.4"	216' 3"	∞
1/6.3	NEAR	6'11.8"	9'11.6"	14'11"	19'10.2"	29' 7.7"	48'11.9"	95'11.8"	184' 5.1"	2344' 5.3"
	FAR	7' 0.2"	10' 0.4"	15' 1"	20' 1.9"	30' 4.4"	51' 0.6"	104' 4.4"	218' 5.6"	∞
1/8	NEAR	6'11.8"	9'11.5"	14'10.7"	19' 9.7"	29' 6.6"	48' 8.8"	94'11.5"	180' 7.5"	1846' 5.5"
	FAR	7' 0.3"	10' 0.5"	15' 1.3"	20' 2.4"	30' 5.6"	51' 4"	105' 7.4"	224' 0.7"	∞
1/11	NEAR	6'11.7"	9'11.3"	14'10.3"	19' 9.8"	29' 4.6"	48' 3.3"	93' 2.4"	174' 3.6"	1343' 1.8"
	FAR	7' 0.3"	10' 0.7"	15' 1.8"	20' 3.3"	30' 7.7"	51'10.3"	107'10.6"	234' 7.8"	∞
1/16	NEAR	6'11.5"	9'11"	14' 9.5"	19' 7.4"	29' 1.4"	47' 6.3"	90' 4.9"	164' 8.3"	923' 8.6"
	FAR	7' 0.5"	10' 1.1"	15' 2.6"	20' 4.8"	30'11.3"	52' 9"	111'10.8"	254' 8.7"	∞
1/22	NEAR	6'11.4"	9'10.6"	14' 8.6"	19' 5.7"	28' 9.6"	46' 8"	87' 3.2"	154' 5.8"	672' 0.8"
	FAR	7' 0.7"	10' 1.5"	15' 3.6"	20' 6.7"	31' 3.7"	53'10.3"	117' 1.7"	283'10.8"	∞
1/32	NEAR	6'11.1"	9' 9.9"	14' 7"	19' 3"	28' 3.4"	45' 3.5"	82' 6.1"	140' 0.3"	462' 4.2"
	FAR	7' 1"	10' 2.2"	15' 5.3"	20' 9.8"	31'11.4"	55' 9.9"	127' 0.7"	350'11.6"	∞
1/45	NEAR	6'10.7"	9' 9.1"	14' 5.1"	18'11.5"	27' 7.7"	43' 7.5"	77' 0.5"	124'10.3"	329' 0.8"
	FAR	7' 1.4"	10' 3.1"	15' 7.5"	21' 2"	32' 9.8"	58' 7.3"	142' 9.6"	506'10.4"	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		7 ft.	10 ft.	15 ft.	20 ft.	30 ft.	50 ft.	100 ft.	200 ft.	Inf.
1/1.9	NEAR	7'	9'11.9"	14'11.8"	19'11.6"	29'11.1"	49' 9.4"	99' 1.5"	196' 5.9"	11052' 6.7"
	FAR	7' 0.1"	10' 0.1"	15' 0.2"	20' 0.4"	30' 0.9"	50' 2.6"	100'10.7"	203' 7.7"	∞
1/2	NEAR	7'	9'11.9"	14'11.8"	19'11.6"	29'11.1"	49' 9.3"	99' 1"	196' 3.7"	10500' ∞
	FAR	7' 0.1"	10' 0.1"	15' 0.2"	20' 0.4"	30' 0.9"	50' 2.7"	100'11.2"	203'10"	∞
1/2.5	NEAR	7'	9'11.9"	14'11.7"	19'11.5"	29'10.8"	49' 8.6"	98'10.2"	195' 4.9"	8400' 3.1"
	FAR	7' 0.1"	10' 0.1"	15' 0.3"	20' 0.5"	30' 1.2"	50' 3.4"	101' 2.1"	204' 9.8"	∞
1/2.8	NEAR	7'	9'11.9"	14'11.7"	19'11.4"	29'10.7"	49' 8.2"	98' 8.6"	194'10.5"	7500' 4.5"
	FAR	7' 0.1"	10' 0.1"	15' 0.3"	20' 0.6"	30' 1.3"	50' 3.8"	101' 3.8"	205' 4.9"	∞
1/3.5	NEAR	7'	9'11.8"	14'11.6"	19'11.3"	29'10.4"	49' 7.3"	98' 4.8"	193' 7.6"	6000' 6.7"
	FAR	7' 0.1"	10' 0.2"	15' 0.4"	20' 0.7"	30' 1.7"	50' 4.8"	101' 7.8"	206' 9.7"	∞
1/4	NEAR	6'11.9"	9'11.8"	14'11.6"	19'11.2"	29'10.1"	49' 6.6"	98' 2.1"	192' 9"	5250' 7.9"
	FAR	7' 0.1"	10' 0.2"	15' 0.4"	20' 0.8"	30' 1.9"	50' 5.5"	101'10.7"	207' 9.8"	∞
1/5.6	NEAR	6'11.9"	9'11.8"	14'11.4"	19'10.9"	29' 9.4"	49' 4.5"	97' 5.6"	190'	3750'10.1"
	FAR	7' 0.1"	10' 0.2"	15' 0.6"	20' 1.1"	30' 2.7"	50' 7.7"	102' 8"	211' 1.4"	∞
1/6.3	NEAR	6'11.9"	9'11.7"	14'11.3"	19'10.7"	29' 9.1"	49' 3.6"	97' 1.9"	188' 9.9"	3334' 2.7"
	FAR	7' 0.1"	10' 0.3"	15' 0.7"	20' 1.3"	30' 3"	50' 8.7"	103' 0.1"	212' 7.1"	∞
1/8	NEAR	6'11.9"	9'11.7"	14'11.1"	19'10.4"	29' 8.3"	49' 1.4"	96' 5.1"	186' 0.2"	2625'11.8"
	FAR	7' 0.2"	10' 0.3"	15' 0.9"	20' 1.6"	30' 3.8"	50'11"	103'10.3"	216' 3.3"	∞
1/11	NEAR	6'11.8"	9'11.5"	14'10.8"	19' 9.8"	29' 6.9"	48' 9.5"	95' 1.8"	181' 3.2"	1910' 2"
	FAR	7' 0.2"	10' 0.5"	15' 1.2"	20' 2.2"	30' 5.3"	51' 3.3"	105' 4.6"	223' 1"	∞
1/16	NEAR	6'11.7"	9'11.3"	14'10.3"	19' 8.9"	29' 4.6"	48' 3.1"	93' 1.2"	173'10.5"	1313' 7.8"
	FAR	7' 0.3"	10' 0.7"	15' 1.7"	20' 3.2"	30' 7.7"	51'10.5"	108' 0.3"	235' 5.4"	∞
1/22	NEAR	6'11.6"	9'11.1"	14' 9.7"	19' 7.7"	29' 2"	47' 7.6"	90' 9"	165' 9.2"	955' 8.9"
	FAR	7' 0.4"	10' 1"	15' 2.4"	20' 4.5"	30'10.7"	52' 7.4"	111' 4.6"	252' 2.8"	∞
1/32	NEAR	6'11.4"	9'10.6"	14' 8.6"	19' 5.8"	28' 9.6"	46' 7.6"	87' 1.2"	153' 9.8"	657' 5.8"
	FAR	7' 0.6"	10' 1.4"	15' 3.5"	20' 6.6"	31' 3.7"	53'10.8"	117' 5.6"	286' 3.5"	∞
1/45	NEAR	6'11.2"	9'10.1"	14' 7.3"	19' 3.4"	28' 4.1"	45' 4.8"	82' 9.3"	140' 8"	467'11"
	FAR	7' 0.9"	10' 2"	15' 5"	20' 9.4"	31'10.6"	55' 8.1"	126' 5.7"	347' 4.1"	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		7 ft.	10 ft.	15 ft.	20 ft.	30 ft.	50 ft.	100 ft.	200 ft.	Inf.
1/1.9	NEAR	7'	9'11.9"	14'11.8"	19'11.7"	29'11.3"	49' 9.9"	99' 3.6"	197' 2.2"	13815' 4.5"
	FAR	7'	10' 0.1"	15' 0.2"	20' 0.3"	30' 0.7"	50' 2.1"	100' 8.5"	202'10.8"	∞
1/2	NEAR	7'	9'11.9"	14'11.6"	19'11.7"	29'11.2"	49' 9.8"	99' 3.2"	197' 0.4"	13124' 8.1"
	FAR	7'	10' 0.1"	15' 0.2"	20' 0.3"	30' 0.8"	50' 2.2"	100' 9"	203' 0.7"	∞
1/2.5	NEAR	7'	9'11.9"	14'11.8"	19'11.6"	29'11.1"	49' 9.3"	99' 1"	196' 3.7"	10500' ∞
	FAR	7' 0.1"	10' 0.1"	15' 0.2"	20' 0.4"	30' 0.9"	50' 2.7"	100'11.2"	203'10"	∞
1/2.8	NEAR	7'	9'11.9"	14'11.8"	19'11.6"	29'10.9"	49' 9"	98'11.7"	195'10.5"	9375' 1.7"
	FAR	7' 0.1"	10' 0.1"	15' 0.2"	20' 0.4"	30' 1.1"	50' 3.1"	101' 0.6"	204' 3.6"	∞
1/3.5	NEAR	7'	9'11.9"	14'11.7"	19'11.4"	29'10.7"	49' 8.2"	98' 8.6"	194'10.5"	7500' 4.5"
	FAR	7' 0.1"	10' 0.1"	15' 0.3"	20' 0.6"	30' 1.3"	50' 3.8"	101' 3.8"	205' 4.9"	∞
1/4	NEAR	7'	9'11.9"	14'11.7"	19'11.4"	29'10.5"	49' 7.7"	98' 6.5"	194' 1.9"	6562'11.9"
	FAR	7' 0.1"	10' 0.1"	15' 0.3"	20' 0.6"	30' 1.5"	50' 4.4"	101' 6.1"	206' 2.4"	∞
1/5.6	NEAR	6'11.9"	9'11.8"	14'11.5"	19'11.1"	29' 9.9"	49' 6"	97'11.6"	191'11"	4688' 2.7"
	FAR	7' 0.1"	10' 0.2"	15' 0.5"	20' 0.9"	30' 2.1"	50' 6.1"	102' 1.5"	208' 9.5"	∞
1/6.3	NEAR	6'11.9"	9'11.8"	14'11.5"	19'11"	29' 9.6"	49' 5.3"	97' 8.6"	190'11.5"	4167' 5.5"
	FAR	7' 0.1"	10' 0.2"	15' 0.5"	20' 1"	30' 2.4"	50' 6.9"	102' 9"	209'11.4"	∞
1/8	NEAR	6'11.9"	9'11.7"	14'11.3"	19'10.7"	29' 9"	49' 3.5"	97' 1.4"	188' 7.9"	3282' 1.8"
	FAR	7' 0.1"	10' 0.3"	15' 0.7"	20' 1.3"	30' 3"	50' 8.8"	103' 0.7"	212' 9.7"	∞
1/11	NEAR	6'11.9"	9'11.6"	14'11.1"	19'10.3"	29' 7.9"	49' 0.3"	96' 1"	184' 8.7"	2387' 4.5"
	FAR	7' 0.2"	10' 0.4"	15' 0.9"	20' 1.8"	30' 4.2"	51' 0.2"	104' 3.1"	218' 0.6"	∞
1/16	NEAR	6'11.8"	9'11.5"	14'10.6"	19' 9.5"	29' 6.1"	48' 7.2"	94' 4.8"	178' 6.4"	1641' 8.8"
	FAR	7' 0.3"	10' 0.6"	15' 1.4"	20' 2.6"	30' 6.1"	51' 5.9"	106' 3.8"	227' 4.6"	∞
1/22	NEAR	6'11.7"	9'11.2"	14'10.1"	19' 8.5"	29' 3.9"	48' 1.1"	92' 5.5"	171' 7.6"	1194' 4.1"
	FAR	7' 0.3"	10' 0.8"	15' 1.9"	20' 3.6"	30' 8.5"	52' 0.9"	108'10.8"	239' 8.4"	∞
1/32	NEAR	6'11.5"	9'10.9"	14' 9.3"	19' 7"	29' 0.4"	47' 3.3"	89' 4.8"	161' 3.1"	821' 6.3"
	FAR	7' 0.5"	10' 1.1"	15' 2.8"	20' 5.2"	31' 0.5"	53' 0.9"	113' 6"	263' 6.2"	∞
1/45	NEAR	6'11.4"	9'10.5"	14' 8.2"	19' 5"	28' 7.9"	46' 3"	85' 8.6"	149' 6.2"	584' 6.9"
	FAR	7' 0.7"	10' 1.6"	15' 3.9"	20' 7.4"	31' 5.8"	54' 5.2"	120' 1.2"	302' 7.8"	∞

DEPTH OF FIELD TABLE FOR GENERAL PHOTOGRAPHIC WORK

Distance		7 ft.	10 ft.	15 ft.	20 ft.	30 ft.	50 ft.	100 ft.	200 ft.	Inf.
f/1.9	NEAR	7'	10'	15'	20'	29'11.9"	49'11.6"	99'10.4"	199' 5.3"	69073' 7.1"
	FAR	7'	10'	15'	20'	30' 0.1"	50' 0.4"	100' 1.6"	200' 6.7"	∞
f/2	NEAR	7'	10'	15'	19'11.9"	29'11.9"	49'11.6"	99'10.3"	199' 4.9"	65620' 0.9"
	FAR	7'	10'	15'	20' 0.1"	30' 0.1"	50' 0.4"	100' 1.7"	200' 7.1"	∞
f/2.5	NEAR	7'	10'	15'	19'11.9"	29'11.8"	49'11.5"	99' 9.9"	199' 3.2"	62496' 8.6"
	FAR	7'	10'	15'	20' 0.1"	30' 0.2"	50' 0.5"	100' 2.1"	200' 8.9"	∞
f/2.8	NEAR	7'	10'	15'	19'11.9"	29'11.8"	49'11.4"	99' 9.6"	199' 2.1"	46872' 5.1"
	FAR	7'	10'	15'	20' 0.1"	30' 0.2"	50' 0.6"	100' 2.4"	200' 9.9"	∞
f/3.5	NEAR	7'	10'	15'	19'11.9"	29'11.8"	49'11.3"	99' 9"	198'11.7"	37498' 7.1"
	FAR	7'	10'	15'	20' 0.1"	30' 0.2"	50' 0.7"	100' 3"	201' 0.5"	∞
f/4	NEAR	7'	10'	14'11.9"	19'11.9"	29'11.7"	49'11.2"	99' 8.6"	198' 9.9"	32811' 8.2"
	FAR	7'	10'	15' 0.1"	20' 0.1"	30' 0.3"	50' 0.8"	100' 3.4"	201' 2.2"	∞
f/5.6	NEAR	7'	10'	14'11.9"	19'11.9"	29'11.6"	49'10.8"	99' 7.2"	198' 4.3"	23437'10.2"
	FAR	7'	10'	15' 0.1"	20' 0.1"	30' 0.4"	50' 1.1"	100' 4.8"	201' 8"	∞
f/6.3	NEAR	7'	10'	14'11.9"	19'11.8"	29'11.6"	49'10.7"	99' 6.6"	198' 1.9"	20834' 0.1"
	FAR	7'	10'	15' 0.1"	20' 0.2"	30' 0.4"	50' 1.3"	100' 5.4"	201'10.5"	∞
f/8	NEAR	7'	10'	14'11.9"	19'11.8"	29'11.5"	49'10.4"	99' 5.2"	197' 8"	16407' 5.8"
	FAR	7'	10'	15' 0.1"	20' 0.2"	30' 0.5"	50' 1.6"	100' 6.9"	202' 4.7"	∞
f/11	NEAR	7'	10'	14'11.9"	19'11.7"	29'11.3"	49' 9.8"	99' 2.7"	196' 9.7"	11933' 7.3"
	FAR	7'	10'	15' 0.1"	20' 0.3"	30' 0.7"	50' 2.2"	100' 9.5"	203' 3.6"	∞
f/16	NEAR	7'	9'11.9"	14'11.8"	19'11.6"	29'11"	49' 8.8"	98'10.5"	195' 4.7"	8205' 4.6"
	FAR	7'	10' 0.1"	15' 0.2"	20' 0.4"	30' 1"	50' 3.2"	101' 1.8"	204'10"	∞
f/22	NEAR	7'	9'11.9"	14'11.7"	19'11.4"	29'10.6"	49' 7.6"	98' 5.5"	193' 8.6"	5968' 5.3"
	FAR	7'	10' 0.1"	15' 0.3"	20' 0.6"	30' 1.4"	50' 4.4"	101' 7.1"	206' 8.5"	∞
f/32	NEAR	7'	9'11.9"	14'11.6"	19'11.2"	29' 9.9"	49' 5.7"	97' 9.3"	190'11.9"	4104' 4"
	FAR	7' 0.1"	10' 0.1"	15' 0.4"	20' 0.8"	30' 2.1"	50' 6.5"	102' 4"	209'10.9"	∞
f/45	NEAR	7'	9'11.8"	14'11.4"	19'10.9"	29' 9.1"	49' 3.2"	96'10.7"	187' 6.8"	2919' 7"
	FAR	7' 0.1"	10' 0.2"	15' 0.6"	20' 1.2"	30' 3"	50' 9.1"	103' 3.8"	214' 2.8"	∞

DEPTH OF FIELD TABLE FOR CRITICAL PHOTOGRAPHIC WORK

Distance		7 ft.	10 ft.	15 ft.	20 ft.	30 ft.	50 ft.	100 ft.	200 ft.	Inf.
f/1.9	NEAR	7'	10'	15'	20'	29'11.9"	49'11.7"	99'10.7"	199' 6.6"	86341' 2.1"
	FAR	7'	10'	15'	20'	30' 0.1"	50' 0.3"	100' 1.3"	200' 5.4"	∞
f/2	NEAR	7'	10'	15'	20'	29'11.9"	49'11.7"	99'10.6"	199' 6.4"	82024' 3.3"
	FAR	7'	10'	15'	20'	30' 0.1"	50' 0.3"	100' 1.4"	200' 5.7"	∞
f/2.5	NEAR	7'	10'	15'	19'11.9"	29'11.9"	49'11.6"	99'10.3"	199' 4.9"	65620' 0.9"
	FAR	7'	10'	15'	20' 0.1"	30' 0.1"	50' 0.4"	100' 1.7"	200' 7.1"	∞
f/2.8	NEAR	7'	10'	15'	19'11.9"	29'11.9"	49'11.6"	99'10.1"	199' 4.1"	58589' 8.5"
	FAR	7'	10'	15'	20' 0.1"	30' 0.1"	50' 0.4"	100' 1.9"	200' 8"	∞
f/3.5	NEAR	7'	10'	15'	19'11.9"	29'11.8"	49'11.4"	99' 9.6"	199' 2.1"	46872' 5.1"
	FAR	7'	10'	15'	20' 0.1"	30' 0.2"	50' 0.6"	100' 2.4"	200' 9.9"	∞
f/4	NEAR	7'	10'	15'	19'11.9"	29'11.8"	49'11.4"	99' 9.3"	199' 0.7"	41013' 9.4"
	FAR	7'	10'	15'	20' 0.1"	30' 0.2"	50' 0.6"	100' 2.7"	200'11.4"	∞
f/5.6	NEAR	7'	10'	14'11.9"	19'11.9"	29'11.7"	49'11.1"	99' 8.2"	198' 8.3"	29296' 5.9"
	FAR	7'	10'	15' 0.1"	20' 0.1"	30' 0.3"	50' 0.9"	100' 3.8"	201' 4"	∞
f/6.3	NEAR	7'	10'	14'11.9"	19'11.9"	29'11.7"	49'11"	99' 7.7"	198' 6.3"	26041' 8.3"
	FAR	7'	10'	15' 0.1"	20' 0.1"	30' 0.3"	50' 1"	100' 4.3"	201' 6"	∞
f/8	NEAR	7'	10'	14'11.9"	19'11.8"	29'11.6"	49'10.7"	99' 6.6"	198' 1.6"	20508' 6.4"
	FAR	7'	10'	15' 0.1"	20' 0.2"	30' 0.4"	50' 1.3"	100' 5.5"	201'10.9"	∞
f/11	NEAR	7'	10'	14'11.9"	19'11.8"	29'11.4"	49'10.2"	99' 4.5"	197' 5.3"	14916' 2.3"
	FAR	7'	10'	15' 0.1"	20' 0.2"	30' 0.6"	50' 1.8"	100' 7.6"	202' 7.6"	∞
f/16	NEAR	7'	9'11.9"	14'11.8"	19'11.7"	29'11.2"	49' 9.5"	99' 1.2"	196' 3.6"	10255'10.9"
	FAR	7'	10' 0.1"	15' 0.2"	20' 0.3"	30' 0.8"	50' 2.6"	100'11.1"	203'10.2"	∞
f/22	NEAR	7'	9'11.9"	14'11.8"	19'11.6"	29'10.9"	49' 8.5"	98' 9.1"	194'11.3"	7459' 8.8"
	FAR	7'	10' 0.1"	15' 0.2"	20' 0.5"	30' 1.2"	50' 3.5"	101' 3.3"	205' 4"	∞
f/32	NEAR	7'	9'11.9"	14'11.7"	19'11.3"	29'10.3"	49' 6.9"	98' 2.5"	192' 8.8"	5129' 7.1"
	FAR	7'	10' 0.1"	15' 0.3"	20' 0.7"	30' 1.7"	50' 5.2"	101'10.3"	207'10.2"	∞
f/45	NEAR	7'	9'11.9"	14'11.5"	19'11.1"	29' 9.7"	49' 4.9"	97' 6"	189'11.1"	3648' 7.9"
	FAR	7' 0.1"	10' 0.1"	15' 0.5"	20' 0.9"	30' 2.4"	50' 7.3"	102' 7.6"	211' 2.7"	∞

1" 3" 9" 5" 1" 4" 9" 3" 4" 3" 9" 8" 1" 1" 9"

COLOR LAB

ANSCOCHROME & EKTACHROME

1 Roll	\$ 2.10	Mounted
5 Rolls	10.00	Mounted
10 Rolls	19.50	Mounted
20 Rolls	38.00	Mounted

(These rolls can be mixed)

35 mm. 20-exposure Daylight or Flash.
Guaranteed fresh, in-date.

1 Roll	\$ 1.30	10 Rolls	12.00
5 Rolls	6.25	20 Rolls	23.50

(These rolls can be mixed)

(One Day Service)

	1 Roll	5 Rolls	10 Rolls	20 Rolls
26 Exposure Mounted.....	1.00 ea.	\$.95 ea.	\$.90 ea.	\$.80 ea.
36 Exposure Mounted.....	1.70 ea.	1.65 ea.	1.60 ea.	1.50 ea.
828 Bantam Mounted.....	.90 ea.	.85 ea.	.80 ea.	.75 ea.
Stereo Mtd. (15 Pairs).....	1.75 ea.	1.65 ea.	1.60 ea.	1.50 ea.
Mercury (36 frames).....	1.50 ea.	1.45 ea.	1.40 ea.	1.35 ea.

120-620-127 in Sleeves..1.00 ea. .95 ea. .90 ea. .80 ea.
Mounted at 25c per roll extra

20 Exposures.....	\$1.40 Mtd.	Stereo (15 pairs).....	\$2.15 Mtd.
36 Exposures.....	2.45 Mtd.	828 Bantam.....	1.00 Mtd.

8 mm.- 25' Magazine \$1.20	16 mm.-100' Roll3.60
8 mm.- 25' Roll1.50	
16 mm.- 50' Magazine ..1.45	KODACOLOR
16 mm.- 50' Roll2.15	PROCESSING80c per roll

2 1/4 x 3 1/4		3 1/4 x 4 1/2	
15	\$ 3.30	15	\$ 5.25
25	5.25	25	8.25
50	10.00	50	16.00
100	19.00	100	30.00

KODACOLOR PRINTS WITH XMAS FOLDERS
 2 1/2 x 3 1/2 from 35 mm. & 828 only (no cropping of this size)

15	\$ 3.30
25	
50	
100	

12	19.00	50	16.00
24	30.00	100	30.00

KODACOLOR PRINTS WITH XMAS FOLDERS

$2\frac{1}{2} \times 3\frac{1}{2}$ from 35 mm. & 828 only (no cropping of this size)

15	\$ 3.30	50	\$ 9.50
25	5.00	100	18.00

$3\frac{1}{2} \times 3\frac{1}{2}$ from stereo, square 127, square 120-620

Kodacolor negative or transparency

15	\$ 4.50	50	\$12.50
25	6.75	100	24.00

$3\frac{1}{2} \times 5$ from 35mm, 828 and all rectangular Kodacolor negatives and transparencies

15	\$ 5.10	50	\$14.00
25	7.50	100	27.00

All Kodacolor Xmas orders must be in the Lab by December 15th.

COLOR SLIDE DUPLICATES
35 mm. to 35

35 mm. to 35 mm.

1-10.....	20¢ ea. mid.	51-100.....	12¢ ea. mid.
11-20.....	15¢ ea. mid.	101-500.....	11¢ ea. mid.
21-50.....	13¢ ea. mid.	501-up.....	10¢ ea. mid.

SUPER SLIDE DUPLICATES

(From Super Slides, 120, 127, 828 Stereo or 35mm)

1-10.....	25¢ ea. mid.	51-100.....	22¢ ea. mid.
11-20.....	24¢ ea. mid.	101-200.....	21¢ ea. mid.
21-50.....	23¢ ea. mid.	201-up.....	20¢ ea. mid.

	1	Any 6	Any 12
2½ x 3¼	\$.20 ea.	\$.18 ea.	\$.15 ea.
3½ x 4½35 ea.	.33 ea.	.30 ea.
4 x 540 ea.	.38 ea.	.35 ea.
5 x 775 ea.	.73 ea.	.70 ea.
8 x 10	1.50 ea.	1.40 ea.	1.25 ea.
11 x 14	4.00 ea.	3.75 ea.	3.00 ea.
16 x 20	10.00 ea.	9.50 ea.	9.00 ea.

From Kodacolor Negatives

2 1/4 x 3 1/4	(from 35mm & 828 only)	.....	\$ .15	ea.
3 1/2 x 3 1/2	(from square negatives)	.....	.23	ea.
3 1/2 x 5		.....	.25	ea.
8 x 7	1 or 2	\$1.00	ea.	3 or more
8 x 10	1 or 2	\$3.00	ea.	3 or more
11 x 14	1 or 2	\$6.75	ea.	3 or more

From Positive Transparencies
(ANSCOCHROME, EKTACHROME and KODACHROME)

2 1/4 x 3 1/4	(from 35mm & 828 only)	.....	\$ .30	ea.
3 1/2 x 3 1/2	or 3 1/2 x 5	.....	.40	ea.
5 x 7	1 or 2	\$1.00	ea.	3 or more
8 x 10	1 or 2	\$3.00	ea.	3 or more
11 x 14	1 or 2	\$6.75	ea.	3 or more

Kodacolor Processing (all sizes).....	\$.90 per roll
35mm Transparency slides from 35mm	
or 828 Kodacolor negatives20 ea.
35mm Transparency slides from 127 sq.	
or 2 1/4 x 2 1/4 Kodacolor negatives30 ea.

**P. O. BOX 36617 DEPT. M.
LOS ANGELES 36, CALIFORNIA**

MODERN TESTS

NEWEST CAMERAS • LATEST FILMS • IMPORTANT ACCESSORIES

MODERN PHOTOGRAPHY'S exclusive monthly equipment report devoted to informative, unbiased field tests of production models submitted to and passed as acceptable by our technical department.

TWIN-LENS OPTIMA 35 ELECTRIC-EYE REFLEX



Manufacturer's specifications: Agfa Optima Reflex twin-lens reflex electric eye 35mm camera. **Lens:** 45mm f/2.8 Agfa Color Apotar with stops to f/22. **Shutter:** With automatic, speeds from 1/30 to 1/500 sec., plus B and flash setting. **Viewing:** Eye-level prism reflex, clear viewing screen with central split-image rangefinder. **Other features:** Built-in electric eye exposure meter coupled to lens and shutter speed, controls for E.I. 10 to 250; red/green sufficient-insufficient light signal inside viewfinder. **Price:** \$169; case, \$15.95. **Importer:** Agfa, Inc., 516 W. 34 St., New York 1, N. Y.

Replace the manual shutter and aperture controls of the Agfa Reflex with the electric eye exposure system of the Optima IIIs described in the August Modern and substitute an eye-

level prism for the waist-level finder: the camera you've got is the Agfa Optima Reflex.

The field seen through the viewing lens of the Optima Reflex seems exceptionally bright and clear, as we would expect from a non-focusing clear glass viewing screen. The twin lenses are mounted so close together that the manufacturer has deemed parallax correction unnecessary for this snapshotter's camera.

Like the other Optimas, the Reflex has three symbols engraved atop the twin-lens mount indicating different distance settings: mountains and a church (infinity) for scenics; three full figures holding hands (approximately 14 ft.) for group shots; two heads (about 6½ ft.) for head-and-shoulders portraits. Actual distances, in feet and meters, are engraved on the bottom of the lens mount.

The shutter operates in the same fashion as the Compur Special employed in the Optima IIIs: both shutter speed and aperture change on a continuous scale as the light level varies. For complete details, see the August MODERN, page 82.

The red/green stop/go exposure indicator in the viewfinder is, like that of the Optima IIIs, activated by pressure on the shutter release.

Photographs taken in a variety of lighting situations on Kodachrome II were universally well exposed, and 11 x 14 enlargements from black-and-white were sharp from corner to corner, indicating that the lens was more than good enough for making snapshots.—P.C.

50MM F/1.9 WESTRO-COLOR FOR 35 EXAKTAS

Manufacturer's specifications: 50mm f/1.9 Isco Westrocolor automatic lens for all 35mm Exakta cameras. **Features:** Apertures to f/22, focus to 1.7 ft.; automatic ex-

ternal diaphragm. **Price:** \$80.00. **Importer:** Exakta Camera Co., 705 Bronx River Road, Bronxville, N.Y.

This lens with its fully automatic diaphragm looks suspiciously like the Schneider lens of the same aperture and focal length. This isn't surprising. Schneider does have more than a passing financial interest in Isco, but both companies are separate as far as designs are concerned. The Westrocolor automatic diaphragm does work precisely in the same manner as the Schneider: press in on an external plunger, the lens closes; remove your finger, it reopens. If you twist the plunger the lens will let you preview your depth of field.

The mount is nicely finished in black alloy with a well-knurled chrome focusing ring which, in our test lens, was just slightly stiff—this will disappear with use. The apertures are easily set by turning a ribbed aperture ring. There are half-stop markings. The front lens element is deeply recessed in the mount, which forms a shade.

Performance followed the pattern of many similar focal-length and aperture lenses for SLR cameras. Sharpness at maximum aperture was very good centrally with much edge fall-off. The edges improved measurably at f/4 while central sharpness continued very good. There was some overall decrease in sharpness at smaller apertures. Our tests indicated that the edge fall-off at large apertures was caused primarily by curvature of field. Unless you were to photograph a flat subject at such apertures, loss in edge sharpness would be of little importance.—H.K.

MECABLITZ 106, 107: TWIN ELECTRONIC UNITS



Manufacturer's specifications: Mecablitz 106 and 107 self-contained electronic flash units with Transistor-Automatic Circuit. **Operation:** Rechargeable nickel-cadmium battery. **Recycling time:** 8 to 11 sec. **Flash duration:** 1/1000 sec. **Other features:** 40 watt-sec. output; 60 to 65 flashes; reflector angle of coverage, about 65°; 2100 ECPS; 5500K color temperature; external

recharging unit, with control light, for 110- and 120-volt current; ready light and open flash button on back of flash head. Price: model 106, \$79.95; model 107, \$84.95. Importer: Burleigh Brooks, Inc., 420 Grand Ave., Englewood, N. J.

The latest versions of the Metz twin electronic flash units, Mecablitz 106 and 107, are smaller, lighter, and more compact than their older brothers, Models 102 and 103. The shape of the reflector has been cut down to account for most of the change in size, but the operation is much the same. Inside (rechargeable nickel-cadmium battery, transistor-monitor circuit) they're identical twins. Both models weigh about 1½ lbs. and have similar operation and performance claims.

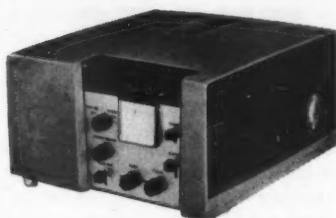
Model 107, with everything packed into one piece, stands 7½ in. high with a 4 x 3½ x 2-in. flash head. But the two-piece 106 consists of a 5¼-in.-long power pack that can be slipped into your pocket and a mere 4½-oz. rectangular 3¼ x 1½ x 2¼-in. head that clips onto your camera's accessory shoe and fits on top of the power pack when not in use. The cord connecting these two pieces is nearly 3 ft. long, giving you enough room to maneuver. With a bracket you can use Model 107 on camera. Just wind the cord around a reel, push the reel down into the pack and clip the head onto the pack.

In use the Mecablitz gives off a low whistling sound between flashes until it's primed and the circuit cuts off. If you're shooting rapidly and don't want to keep checking the ready light on the back of the flash head, you can use this whistle as an audible signal.

In testing these units we came up with some interesting results, in some cases more generous than the manufacturer's claims. The 106 unit gave us between 60 and 65 flashes per charge with an initial recycling time of 8 to 9 sec. (both values claimed by the manufacturer). After about 30 flashes, recycling time increased from 13 to about 30 sec. at the end. The 107 unit did much better, giving us 75 to 80 flashes. (The company claims identical performances for both units.) Recycling remained at the 9- to 11-sec. level for nearly 50 flashes, then increased gradually to 30 sec. Though identical, the components of these units can vary because of individual differences in the manufacturing tolerances which can vary output and recycling time. In this case it showed up.

For both units we found the best guide number for Kodachrome to be 28.—D.L.M.

BALOMATIC 755 SHOWS ALL 2¼, 2 x 2 SLIDES



Manufacturer's specifications: Bausch & Lomb Balomatic 755 2¼ x 2¼ slide projector. Lens: 7-in. f/3.5 Balcoted. Lamp: 500-watt CZA. Operation: Automatic and semi-automatic. Other features: Illuminated control panel, editing slot, and preview screen; 4- to 90-sec. automatic slide interval timer; single knob for forward, reverse control; blower system for cooling, pre-popping, and slide holding; permanently stored power cord. Price: With one slide tray and carrying case, \$179.50. Extra trays, \$1.95 each. Manufacturer: Bausch & Lomb Inc., Rochester 2, N. Y.

This big, beefy, 22-lb. Balomatic 755 is the first automatic 2¼ x 2¼ slide projector we have tested and found acceptable. In the past, 2¼ projectors have all been manually operated. With special plastic adapter mounts, it also accepts 2 x 2 slides—both sizes can be intermixed in one 40-capacity magazine. You can project 2¼ slides in cardboard or glass mounts or use the special B & L plastic mounts (\$3.95 for box of 40) which fit easily into the magazine. With these special mounts you place the transparency against just one piece of thin glass and slip this sandwich into the plastic frame. In pushing the sandwich all the way into the mount, you have to grasp it with a handkerchief, clean cloth, or lens tissue to prevent putting fingerprints on the slide.

The smaller slides (any slide in a 2 x 2 mount) must be in a cardboard mount which then is fitted into a plastic frame (\$1.25 for 20) the same size and thickness as the 2¼ frames.

Physically (except for size) and operationally the 755 is just like its baby brother, Balomatic 655 for 2 x 2 slides only (see "Modern Tests," February 1961)—neat and square, measuring 12 x 12 x 6 in., with no external frills. All controls are grouped on a small illuminated panel on the right side. The small preview screen on this panel lights up when the master control knob is either on "edit" or "tray rel." In the former position, you can remove the slide in viewing posi-

tion by pressing a lever which pushes the slide up through a slot in the top of the projector. While on "tray rel" there is no slide in viewing position and you can move the tray to any position you like, either by pushing it directly or turning the manual selector knob. A small window near the edit slot shows the number of the tray's groove in viewing position.

Press the elevation lever and you release a spring leg in the front part of the projector. Raise the projector to the desired level, release the lever and the leg locks in place. If you must tilt the projector, you just turn a small leveling foot in the rear right corner.

Now turn the master knob to "operate" and you're ready to go. Press the change button and a new slide comes on the screen. You can reverse direction by holding the button down a little longer (a few practice tries will give you the right length of time). If you keep holding the button down, the magazine keeps going backward until you let go. The Balomatic also works automatically on a timer with variable intervals between slide changes from about 4 sec. to a minute and a half. This timing cycle can be interrupted by any other operation (edit, etc.) without damage or the need to reset the mechanism. There's a 15-ft. accessory remote control cord (\$4.95) with a button in the handle that works just like the projector change button.

It's a good idea to let the projector run for a couple of minutes before you start showing slides, so that slides waiting to be projected can be prewarmed. This pre-popping system worked well during our tests. However, it was sometimes necessary to refocus whenever a slide of a different size or mount was shown.

Other features of the 655 carrying over into this larger model are: the focusing knob on the control panel; the open groove tray with metal spring clip in each groove so that you can turn the tray over with very little chance of the slides spilling out; automatic blackout of the screen during slide changing and at the end of each magazine load, provided there is a slide in the last groove. However, if there is an empty groove in the magazine, this blackout does not work.

We deliberately mangled a cardboard-mounted 2¼ slide to test the dejamming mechanism. By turning the projector off, tipping it on its side, and turning the dejam shaft with a coin, this jammed slide was loosened and could then be removed by the usual editing procedure or with a pair of tweezers. Slides in the plastic mount did not jam unless they had not been

(Continued on page 110)

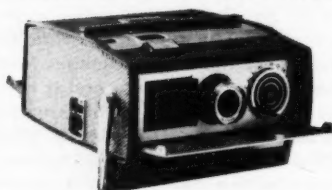
MODERN TESTS

(Continued from page 109)

pushed all the way down the slot during editing. In this case they were easily unjammed. Lens sharpness and illumination tests showed only slight corner fall-off with $2\frac{1}{4} \times 2\frac{1}{4}$ slides, and virtually none with 35mm.

For \$22.50 you can have an accessory 5-in. f/3.5 lens with an iris diaphragm. For very bright or overexposed slides you close the diaphragm, thus controlling illumination and increasing depth of field. The standard 7-in. f/3.5 lens does not have this diaphragm control.—D.L.M.

BELL & HOWELL 35MM WIRELESS PROJECTOR



Manufacturer's specifications: Bell & Howell 764W Tele-Sonic Wireless Remote Explorer Slide Projector. Lens: 100mm f/3.5 Trionar. Lamp: 500-watt DAK. Operation: Semi-automatic by ultrasonic, wireless remote control. Other features: Remote focusing and slide changing; manual control lever for reverse; built-in previewing panel; provision for inserting or removing slides during projection. Price: With one 36-slide Micro-Mount tray, \$269.95. Manufacturer: Bell & Howell, 7100 McCormick Rd., Chicago 45, Ill.

Wireless remote control? Now, isn't that a real useless gimmick very liable to go right out of whack in short order? Picking up the tiny wireless control unit, no larger than that on wired sets, gave us an eerie sensation. Nothing at all remained to tie us to the projector. We inserted the slide tray, turned on the projector and pressed the advance button. With a mind of its own, the Explorer shifted to the first slide. Unnerved, we dropped the control unit on the hardwood living room floor and looked down to find the pieces. No pieces. It remained intact and failed to rattle when shaken. We gingerly gave the advance another pressing and the slide changed. (Prospective owners should not take

our accident as an open invitation to kick the control around. It does state, "Precision Instrument, do not drop.")

The out-of-focus picture needed correcting. We pressed the focusing button and the picture became even fuzzier. Another push of the button halted the lens movement and a third push started the lens traveling in the other direction. It complied, shifting slowly so we were able to stop right on what we thought was the button. However, someone felt that a sharper picture was possible, so we marched, control in hand, right up to the screen until our nose nearly touched it. Then, a full 16 ft. from the projector, we focused with a precision impossible with a non-wireless control projector.

In experiments with the control unit we found that we could control operation up to 40 ft. in front of the projector, and change slides at a rate of nearly one a second. The maximum working distance of the unit depends upon its position in relationship to the front-mounted microphone. When in the rear of or to the side of the projector, the distance is understandably less. Behind the projector (and the mike) it's 4 ft.

In short, we became so intrigued with the convenience, simplicity and freedom of the remote control we almost forgot the projector itself.

When we first pulled it from its foam-cushioned shipping box we were annoyed to see that the foam and the very sensible rubberized stripping which cushions all edges of the Explorer had an affinity for each other. The foam stuck to the rubber and had to be scraped off with a fingernail. When we had finished fingernail scraping, we had a handsome, good-sized projector with a rubber-stripped carrying handle which also serves as a front foot when the Explorer is used. (When not in remote use, the control unit fits into a compartment beneath the projector's top cover.)

The Explorer is built around B & H's own slide tray design, a compact $7\frac{1}{4}$ -in. plastic tray with plastic Micro-Mounts. Unlike all other slide tray mounts, you project through the transparent Micro-Mount. To load each Micro-Mount, you remove it from the tray, turn it on its side, slip the transparency in from the bottom and return the Micro-Mount to the tray. It does take time and only cardboard

slides can be accommodated, but the end seems to justify the means. The projector does not jam. The optical design of the Micro-Mount, which has a circular grid in the center, seems to aid the overall sharpness of the image. The 35mm slides projected were clear and brilliant to the edges with no change in focus before, during or after projection. (Because of the variance in some cardboard mounts, a slight correction in focus was very occasionally necessary.)

In a check of illumination evenness our cadmium sulfide cell meter could detect virtually no change in illumination between the center of the picture area and the picture corners. In the superslide area, however, the very corner tips exhibit slight darkening.

The projector is exceptionally cool-running. You can feel heat only at the exhaust side of the quiet fan. Slides remain well within acceptable tolerances. The projector is extremely convenient, aside from two negative points—a fairly heavy carrying weight (20 lb.) caused by an extremely rugged construction, and the necessity of using a switch on the projector when you wish to reverse the slide tray direction.

Press a top button. The back and front covers flip open to reveal an illuminated rear panel with elevation and lamp controls and the lens and microphone at front. You can easily remove or insert slides during projection. The editing-previewing light is actually a full-sized, evenly illuminated panel with its own semi-automatic loading clip which allows you to flip the slide right into the tray during projection.

We were wondering, however, what ultrasonic sounds aside from the control unit might cause the projector to operate, particularly since we have several nice brown bats inhabiting the trees outside our house. Either the machine left them speechless, or they weren't tuned in on our frequency.

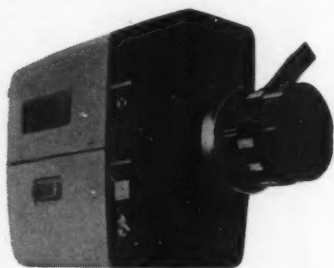
—H.K.

ELMO ZOOM POWERED BY ELECTRIC MOTOR

Manufacturer's specifications: Elmo Zoom 8-E electric eye movie camera. Lens: 10 to 30mm f/1.8 Elmo zoom. Viewing: Through-the-lens with beamsplitter in front of diaphragm. Focusing: Down to 5 ft. on ground-glass spot in viewfinder. Fps: 12, 16, 24, 32, and single frame. Other features: Drop-in loading; electric motor drive; automatic electric eye for E.I. 10 to 40, and manual control; reverse filming at 16 fps; frame counter; cable re-

lease and remote control sockets. **Price: \$189.95. Importer: The FR Corp., 951 Brook Ave., New York 51, N. Y.**

The Elmo 8-E looks precisely like the 8-S (see "Modern Tests," February 1961) with some important differ-



ences. The 8-E has an electric motor operated by four penlight batteries and has a top fps speed of 32 rather than 48. The 8-E has several features not found on the spring model—reverse filming, frame counter and remote control socket.

The viewing system is the same as that of the 8-S. Since the beamsplitter is in front of the diaphragm, image brightness is high at all openings.

In testing the electric motor we found that the fps rate was extremely accurate. The reverse on the electric motor works smoothly, according to our tests. However, the frame counter is not adjustable, and while quite useful requires that you remember your starting point for counting frames. Provision has been made for an accessory fader.

The manual zoom action, as on the spring model Elmo, works smoothly, without binding.

The lens on the 8-E is the same one as that on the 8-S. Our lens tests on the 8-S showed that the Elmo zoom was "a bit soft over the entire frame at maximum aperture. However, at f/2.8 sharpness improved considerably. At f/4 the entire frame appeared acceptably sharp and at f/5.6 sharpness was good. The best opening was f/8 and there was no decrease in sharpness as the aperture was made smaller."—M.A.M.

B&H 8MM PROJECTOR HAS WIRELESS REMOTE

Manufacturer's specifications: Bell & Howell Telesonic remote control 8mm projector. **Lens:** 23mm f/1.2. **Lamp:** Low-voltage Sylvania Super Tru-Flector (150-watt, 21-volt). **Projection speeds:** Rheostat-controlled 16 to 24 fps. **Reel capacity:** 400 ft. **Other features:** Wireless remote control; automatic threading; normal-bright lamp light

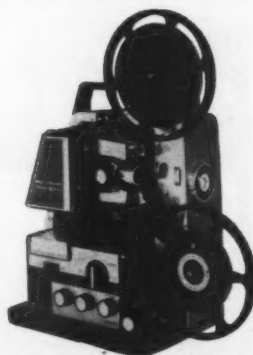
settings; power cord on spring-loaded reel; all controls on single panel; folding reel arms; room light outlet; swingout film gate; rewind, reverse, still projection; built-in Mylar tape splicer. **Price: \$299.95. Manufacturer:** Bell & Howell, 7100 McCormick Rd., Chicago, Ill.

Eight-millimeter projectors aren't what they used to be—and that's just fine. The Bell & Howell Telesonic is one of those machines that exhibit a good deal of thinking about what a projector should do for its owner in addition to showing his films.

First, B&H has solved the problem of what to do with the power cord when you place the cover back on the projector. Usually one tries to cram it in as best one can. On the B&H the cord is wound back automatically into the projector on a spring-loaded reel.

The automatic threading feature is something we've come to accept today. But the one on the B&H is virtually foolproof. Film never jammed once during our tests. Our one objection is the fact that it's virtually impossible to remove film for splicing once it's engaged in the automatic threading path.

The grouping of all controls—including the framer—on one panel is a real convenience. We found that



with only a little practice we could operate any of the controls in the dark without error.

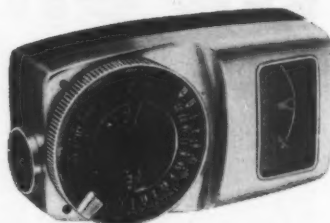
The Telesonic also has a two-level light control—average and bright. Frankly, we found that with film underexposed about a stop or more the bright setting helped only slightly to improve the image.

Now for the wireless remote control system. The tiny hand transmitter sends out signals to a receiver inside the projector by means of click switches and controls forward, reverse, stop and start. Usually, the projectionist sits right next to the machine—about the worst place to watch the show. With the remote control we were able to sit where we chose. All that's necessary is that you have a straight line view of

the machine—though in some cases the signal can be bounced off a wall.

The 23mm f/1.2 lens provided a large amount of light on the screen—even at the average light setting. We were able to project a 7-ft. (largest we tried) image without trouble. Image sharpness and brightness were good with little significant edge fall-off.—M.A.M.

SEKONIC MICROLITE: MODERATE PRICED CdS



Manufacturer's specifications: Sekonic Microlite cadmium sulfide cell reflected-light type exposure meter. **Features:** Mercury battery power source; 40° acceptance angle; ASA indexes 6 to 12,000 (1 to 12 in new ASA scale); EV (LV5) —3 to 19; speeds 16 sec. to 1/2000 sec.; apertures f/1 to f/32; movie scale 8 to 64 fps; dual range; on-off switch; replacement batteries—Mallory RM-640 or Eveready E640. **Price:** Less than \$25. **Importer:** Sekonic Inc., 130 W. 42 St., New York 36, N. Y.

About 6 months ago in the report on CdS systems (page 102 of the May 1961 MODERN) we showed a pre-production Sekonic Microlite exposure meter as an illustration of one future CdS meter. Now we have the production version of this meter, and here-with the results of our tests.

Weighing 7 oz. and measuring about 3 1/4 x 2 x 1 1/4 in., the Microlite meter is slightly smaller than but equal in weight to many popular selenium-celled meters. Whereas with selenium meters, electric current is generated by the selenium itself, with the Microlite it's supplied by a 1.3-volt cylindrical battery measuring about 3/8 x 5/8 in. (said to last about a year).

You make reflected light readings with the CdS Microlite meter much the same as you would with the conventional selenium type units (as yet there is no incident attachment available for this meter). First you set the ASA speed on the meter's clickstop dial by gripping a small piece of metal with a finger nail and pushing forcibly (both conventional numbers and ASA degree numbers can be set). Then you
(Continued on page 120)

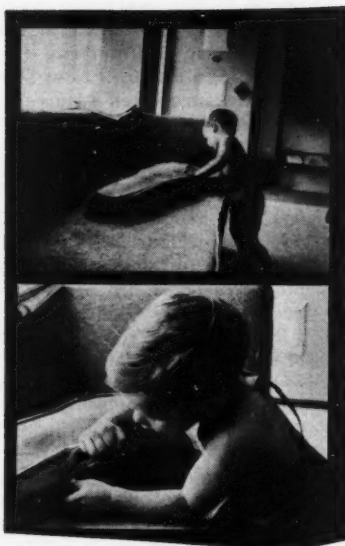
TAKE A ROOM MAKE A MOVIE

MAKE ALL the shooting plans you like—but don't expect a one-and-a-half-year-old youngster with a mind of his own to pay the slightest attention. He'll do just as he chooses. You've probably already had the experience of chasing him or her around trying desperately to get just a few seconds of footage. Or, conversely, you may have spent hours trying to get a stubbornly immobile youngster to move just a little bit. But getting a coherent, interesting 50 ft. of 8mm or 100 ft. of 16mm film of your child can be relatively painless if you combine what you know about the youngster with basic movie making techniques.

The problem breaks down into confining him to a manageable area, arousing his interest, and getting a variety of shots.

We've found from experience that most living rooms are ideal for shooting movies of children. They're usually large enough to provide plenty of area for roaming about—but small enough to let you keep things properly under control.

Lighting should be as unobtrusive and comfortable as possible. We prefer either bounce light or window light for shooting children. Both are easy on the eyes and relatively cool. For bounce light aim your barlight at a wall or ceiling, which should be white or (Continued on page 126)



A. STRAIGHT ZOOM: Using couch or other linear object to lead viewer's eye to main subject makes zoom appear more like dolly shot.



B. TELE IN CLOSE: Tele lens need not be confined to shooting from long distances. Here, it provides tight framing and at the same time throws distracting background out of focus.



C. QUICK CUTTING: By adding cuts of related toys before and after shot of child, even briefest play action can be made into full sequence.



D. ANGLED ZOOM: Shooting down on subject from above helps to relieve monotony of constant eye-level zooming. In making a shot like this, you should take care to zoom slowly.



E. LOW ANGLE: Avoid shooting too many scenes from adult height. Get down to child's level. Better yet, shoot from the floor itself so that the camera is actually lower than the subject.



F. CHANGE OF PACE: Not every scene has to be composed of rigid long shot, medium shot, close-up sequence. It can, as above, start with tight close-up, progress to even tighter framing, and then, for a change of pace, shift back to medium or even long shot. Quick cutting combined with interesting images add up to good motion picture pace.



5

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DRY ROT IN BOOKS

(Continued from page 71)

How to Use Variable Contrast Papers, by Jacobs \$2.50. The makes of variable contrast papers are different but Jacobs sorts them out, gives practical aid on how to put 'em to work.

Lootens on Enlarging & Print Quality, \$4.95. Expert teacher Lootens has been gone these many years, but his original work updated by others is still the classic in the field.

Miscellaneous

Floyd's Photo Tips \$2.50. Simple gimmicky and ungimmicky shortcuts you can use in shooting, processing and enlarging.

How to Sell your Pictures at a Profit, by Bennett and Maschke \$2.95. Brightly written how-to-sell information plus listing of 772 markets.

Instant Lens Testing Chart and Book, by Tydings \$1.95. If you can get the chart unfolded and suitably flat you'll find it the best test kit currently available.

Mounting, Protecting, Storing Slides, by Rothschild and Wright \$1.95. Just that and very complete too.

Outer Space Photography for the Amateur, by Paul \$2.50. How to shoot upward with everything from 50mm lenses on 35mm cameras to super-grand telescopes. Easy personalized style.

Where & How to Sell Your Pictures, by Ahlers \$1.95. Best guide on finding markets, packing, keeping records, analyzing publications. Full market listing.

Words & Pictures, by Hicks \$5. The ex-executive editor of "Life" gives a valuable inside glance into the day-by-day photo operation of guess what magazine.—THE END

DO IT, DO IT, DO

CHECK YOUR PHOTO LAMPS. After buying new reflector or photoflood lamps, it's a good idea to check their brightness output and repeat the check every so often. An easy way of doing this is to set up the lamp and measure off a distance of 6 ft. Set your exposure meter at ASA 10 and hold it at this distance, aimed directly at the lamp. Make a note of the meter reading and the date. After using the lamps for some time, take another reading, paying particular attention to the lamps used for taking movies or stills with color film. The life of these lamps is generally 4-6 hours and a meter reading of an increase of one f-stop usually means a drop in Kelvin temperature, which would give an off-color cast to your pictures. If this is the case, it is best to use these lamps only for black-and-white.

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MODERN TESTS

(Continued from page 111)

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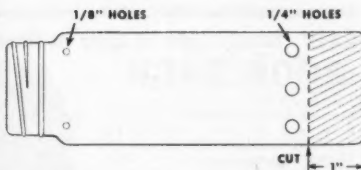
Tests made with the Microlite showed that it made dependable readings in virtually all normal picture taking situations. When set for ASA 400 it made accurate readings in low-light situations down to the equivalent of f/2 and 1/4 sec.

As with selenium-celled meters, the Microlite has provision for zero adjustment—you place your hand over the cell, wait until the needle settles (it takes a few seconds), then turn a small screw on the back of the meter to zero it.

However, there is no way to check battery performance with the Microlite (we hope Sekonic will add this feature in future models).—E.M.

DO IT, DO IT, DO

BATHTUB PRINT WASHING. You can use your bathtub or kitchen sink as a print washer—once you've made the right stopper. All you need is a plastic baby bottle, a few heavy rubber bands (1/4 x 2 1/2-3 in.), a sharp knife and a paper punch. Measure 1 in. from the base of the bottle and cut completely around. Using the hole punch, make



eight 1/4-in. holes all around the bottle, a little above the cut-away edge. (These will allow the water to flow out and prevent prints from covering the open top.) Also make four 1/8-in. holes about 1/2 in. away from the neck of the bottle, to allow hypo to escape. To assure a tight fit, twist a few rubber bands around the neck of the bottle and force it into the drain of the sink or tub.

YOU'VE TRIED THE REST...NOW BUY THE BEST!

LORD

COLORED



KODACHROME MOVIE FILM

With Processing Included!

• ALL FILMS ARE FACTORY FRESH • NOV. 1962 EXPIRATION DATE

DEPENDABLE COAST-TO-COAST FILM SERVICE!

Licensed by Kodak

FREE! KODAK SLIDE VIEWER
• For 35mm, 828 and 127 slides
• Folds flat to fit pocket or purse
with your order for 35mm Color Film

35mm KODACHROME			
WITH PROCESSING INCLUDED			
ALL FILMS MOUNTED	• DAYLIGHT OR TYPE F		
KODACHROME	3-ROLLS	10-ROLLS	
(Same prices apply for Ektachrome and Anscochrome)	28 exp. 28 exp.	28 exp. 28 exp.	
	7.50	11.95	23.00 35.00
SUPER ANSCOCHROME	8.00	12.75	25.50 40.00
HIGH SPEED EKTACHROME	8.75	14.25	27.50 42.50
Day, ASA 165—Type B, ASA 125			
• Please include 5¢ postage per roll			



Take your COLOR shots

Mail your film to Lord

Receive your film at home

ALL FILMS ARE FROM ORIGINAL SEALED FACTORY FRESH BULK

8mm COLOR FILM
Famous Brand • ASA 10 Daylight
WITH PROCESSING INCLUDED
25' dbl. roll 2.25 per roll
3 for 6.45 • 10 for 20.

35mm 20 exp. COLOR FILM
Famous Brand • ASA 10 Daylight
WITH PROCESSING INCLUDED
2.00 per roll
3 for 5.70 • 10 for 18.

B & W Sub-Minature
Developing & Printing
Ultra-fine grain developed with Jumbo S.W. matte prints, per 20 exp. roll . 2.00
Kodachrome & Anscochrome processing only, per roll (mounted) 1.50

DAY, OR TYPE A	3-Rolls	10-Rolls
8mm ROLL 25' Dbl	8.95	28.00
8mm Ansco Moviechrome	8.95	28.00
16mm ROLL 100'	25.00	81.00
8mm ROLL 100'	28.50	89.00
8mm Mag. 25' Dbl.	12.00	38.00
16mm Mag. 50'	18.00	58.00
16mm Anscochrome 100' Roll	26.25	85.00
16mm Super Anscochrome 100' Roll	29.00	95.00
Include 5¢ post. per 8mm roll, 10¢ per 16mm roll		

MINOX B & W DEVELOPING AND PRINTING

Ultra fine grain developed	per roll	1.00
3x4 prints	per print	.15
5x7 enlargements	each	.75
(Hand made on imported paper)		
MINOX EXCLUSIVES		
Entire roll developed & enlarged on 8x10 S. W. Glossy		1.95
Enlarged on 11x14 D. W. Glossy		2.95

MINOX COLOR PROCESSING & PRINTING

Anscochrome processing	1.50
2 1/2 x 3 1/2 color prints ea.	.50
MINOX FILM	
Anscochrome, 36 exposures	1.95
All B&W films (20 exp. cartridges)	2.25
(Specify ASA speed for B&W)	

LOAD YOUR OWN AND SAVE!
KODACHROME OR ANSCOCHROME OR EKTACHROME
35mm Bulk COLOR FILM

WITH PROCESSING INCLUDED	
20 Ft. [To make (8)-20 exp. or (5)-36 exp.]	16.95
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100 Ft. [To make (32)-20 exp. or (20)-36 exp.]	60.00
HIGH SPEED EKTACHROME	
28 ft. 21.95 • 50 ft. 37.00	
• 100 ft. 70.00	
FREE! Mailing bags and empty 35mm cartridges. Specify preference for 20 or 36 exposures.	



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SPECIAL 4.95

Please send check or money order with films. Please do not send your remittance separately.
Minimum order: \$1.
Sorry, no C.O.D.'s.
Please include postage, excess is refunded.

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Developing of KODACOLOR WITH JUMBO COLOR PRINTS
8 exp. roll . . . 2.00
12 exp. roll . . . 2.75
20 exp. roll . . . 3.70
Developing any size roll . . . 70¢

COLOR PRINTS from KODACOLOR JUMBO SIZE Made from Kodacolor neg. only

127, 120, 620, 828, 35mm	10 for 195
5X (5 x 5 or 5 x 7)	each 1.00 3 for 2.85
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PRINTED ON NEW KODAK EKTACHROME PAPER		
5-2X (2 1/2 x 3 1/2) (from 35mm & 828)		1.00
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3-3X (3 1/2 x 5) (from 35mm & 828)		1.00
Below sizes are Studio Mounted.		
2-4X (approx. 4x5) (from 35mm & 828)		1.00
Printed on Ansco Printon:		
5x7 95¢ each	8x10 1.05 each	
3 for 2.75	2 for 3.50	

BLACK & WHITE FILM & PROCESSING!

BY POPULAR DEMAND!
8mm Kodak TRI-X
HIGH SPEED ASA 200
PROCESSING INCLUDED
Ideal for shooting under difficult light conditions!
8mm x 25' Dbl. 3-Rolls . . . 7.75
100' for Bolex ea. 9.00
Also available in Kodak PLUS-X (ASA 80)

35mm FILM (Without Processing)
35mm x 20 exp. 3-ROLLS . . . 1.50
10-ROLLS . . . 3.95
35mm x 36 exp. 3-ROLLS . . . 1.80
10-ROLLS . . . 4.90
Include 25¢ postage.

TRI-X 35mm BULK FILM
DO IT YOURSELF AND SAVE!
28 ft. 1.35
50 ft. 2.00
100 ft. 3.50
(Without Processing)
FREE: Empty cartridges included with every bulk order. Include 25¢ postage.

PANCHROMATIC ROLL FILM 120, 620, 127
ASA Day-Tung 80 64
10 rolls 2.95

CUSTOM DEVELOPING & PRINTING
Ultra fine grain finishing and professional print quality . . . COMPLETE WITH A FRESH ROLL OF FILM
Specify size.
8 exposures . . 1.00
12 exposures . . 1.25
20 exposures . . 1.50
36 exposures . . 2.50

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Instant slide protection. Prevent scratches and abrasion marks. Fit all standard cardboard mounts.
2x2 100 for 1.88 2 x2 1000 for 16.50
2x2 20 for .59 2 1/2x2 100 for 2.98
stereo 100 for 2.88

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• Holds up to 400'
• Will load any camera spool
• Specify 8mm or 16mm
• Pays for itself with first bulk film order.
(Include 65¢ postage)

Send for FREE mailing bags and price list

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35mm x 20 exp. w/mounting	1.00
35mm x 36 exp. w/mounting	1.75
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35mm x 28 exp. Stereo w/mounting	2.75
MOVIE FILMS	
8mm Roll	1.00
8mm Mag.	.75
16mm Mag. 50'	1.00
16mm x 100' Roll	2.50
8mm x 100' (Bolex)	3.95
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120, 620, 127 Anscochrome, Super Anscochrome, Ektachrome	31.00
You may order prepaid processing mailers at our above prices.	

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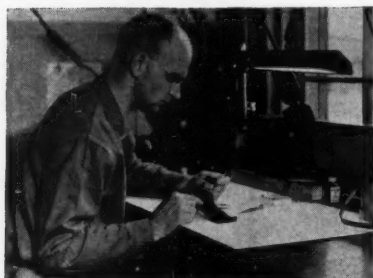
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TOO HOT TO HANDLE

(Continued from page 69)

Tower Type 3 camera, but know the 50mm f/2 Summar quite well. Leitz discontinued it some time ago. It's noted for its extremely poor corner definition even at smaller apertures and will definitely not give sharp pictures wide open when compared with even moderately priced modern lenses.

I purchased a Contaflex Super 35mm single-lens reflex with a 50mm f/2.8 Zeiss Tessar lens. Now I'd like to acquire wide-angle and tele component lenses. Can you suggest something that would be cheaper than the \$75 for the Zeiss units? Also, would you recommend using a monocular to get greater tele effects than permitted by the 85mm Pro-Tessar? — Al Tortosa, Dorchester, Mass.

As far as lenses are concerned, only the Pro-Tessars manufactured by Zeiss will work properly with the Contaflex Super. While other companies offer accessory components, they are of extremely inferior grade, and we can't in good conscience recommend them. We'd definitely recommend the Zeiss monocular, which we have found to be a splendid unit.—THE END

Correction: Readers who noticed the answer to the question on the comparison of the 58mm f/1.4 Nikkor and the 50mm f/2 Nikkor in the October "Too Hot To Handle" column may have been a bit confused. It would appear that we had never tested the f/2. But the September issue carries a complete comparison between the two. Unfortunately the October item was written several months ago—long before we received the f/2 for testing. The type should have been thrown out, but accidentally got into the magazine in the last-minute rush of going to press.

DO IT, DO IT, DO

EFFICIENT SQUEEGEE. A windshield wiper makes an excellent squeegee for wiping prints, roll film and cut film. Be sure to purchase a good quality wiper in a fairly large size.

DIFFUSE THROUGH HOOPS. You can make a handy diffuser for photoflood reflectors from a pair of embroidery hoops, a piece of thin fabric and a few paper clips and tacks. Wooden or metal embroidery hoops of the same diameter as your reflectors can be bought at the dime store. Bend the paper clips into the shape of hooks to fit onto the rim of the reflector, and fasten the inside hoop to the rim. Then stretch the fabric over the hoop and place the outer hoop over it to hold it tight.

SPACE CAPSULE FOR SALE!



The G-E PowerMite II, crawl-in toy for kids of all ages. Great setting for flash pictures, great Christmas gift. Made of sturdy corrugated board, 4' 4" high. Complete with working instrument panel, battery-powered electric motor, space helmet. Just \$5.00 and 1 front panel from any G-E Flashbulb 12-pack.

Order from: Capsule, Box 5500E, Cleveland 1, Ohio. Make checks to "General Electric Co." Offer expires Feb. 1, 1962. Limited to continental USA and Hawaii. Void where restricted or prohibited. Allow 3 weeks for delivery.



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SINGLE WEIGHT GLOSSY ENLARGING PAPER

High Speed Glossy for pro and amateur use. For commercial, press and exhibition type photos. Yields good rendition of detail and density of range. Amazing ability to retain maximum detail with no loss of brilliance. Available in contrasts 1, 2, 3 (Specify "P")

	50	100	500	1000	100 SHEETS
5x7	—	2.29	9.30	17.70	8x10
8x10	—	4.40	19.50	37.50	440
11x14	4.25	8.50	39.50	79.00	

5.00 Minimum
Add postage & insurance

New! LUXOR ENLARGING PAPER

A double weight CHLORO-BROMIDE, mono-contrast paper designed primarily for printing where speed is desired without sacrificing quality. Requires reduced enlarger illumination permitting the lens to be stopped down for maximum sharpness. Available in two desirable surfaces LUXOR "E" is off-white, fine-grain lustre; and, LUXOR "V" is a cream-white SILK. Fine contrast; Ideal for portraits.

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5x7	—	2.63	12.50	8x10
8x10	—	5.79	24.95	579
11x14	5.65	—	47.00	

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DOUBLE WEIGHT ENLARGING PAPER

Fast BROMIDE paper which yields blue-black prints for all types of enlarging work. Choose "FF" for glossy; Contrasts 2, 3 "N" for semi-matte and "C" for a truly dead matte, in popular contrasts 1, 2, 3, 4.

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5x7	—	2.59	12.25	22.95	8x10
8x10	—	5.69	24.25	46.95	569
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8 x 10 MULTI CONTRAST PACK

ASSORTED CONTRAST PACK TO GIVE YOU CORRECT PRINTS FROM EVERY NEGATIVE.

NO FILTERS NEEDED

No need to carry extensive stocks of any particular contrast since you have everything. Each 100 sheet box contains: 10 sheets contrast #1; 45 sheets contrast #2; 35 of #3; and 10 sheets of contrast #4. Enlarging paper packed separately in light proof containers.

SINGLE WEIGHT
GLOSSY, 100 SHEETS

580

DOUBLE WEIGHT
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\$5.00 Minimum. Add postage & insurance

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No price rise here! German made PANCHROMATIC film at a fraction of prices you've been accustomed to paying. Fresh 1963 dating. All-purpose ASA 100 in all sizes. 4x5 & 5x7 also in ASA 200, 120/620 also available in ASA 40.

4x5 100 sheets ... 7.19	8x10 25 sheets ... 8.89
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120/620 ASA 40, 100	120/620 ASA 200
25 rolls 8.00	25 rolls 8.00
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IN DOUBLE WEIGHT, LUSTRE SURFACE. A high-speed enlarging paper widely used for wedding and baby photography, school and graduation pictures, wherever speed, high quality and brown black image tones are required. Features the most desirable fine grain surfaces. Choose Portrait "P" for Golden Ivory; Portrait "Q" for Cream-White; Portrait "R" is Pure-White; and Portrait "V" is white SILK, in contrasts 1, 2, 3.

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5x7	—	2.79	12.75	23.95	595
8x10	—	5.95	26.25	46.95	
11x14	5.75	11.50	46.25	—	

5.00 Minimum.
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CONTRASTS 1, 2, 3

10 x 12 DARKROOM SAFELIGHT COMPLETE WITH 3 KODAK WRATTEN FILTERS

All-metal unit, with baseboard and hanging chain. PLUS 3 Kodak Wratten filters (Series O, I, II). Suspends from ceiling for direct or indirect illumination. Complete with electric cord, on-off switch.

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NO LOWER PRICE ANYWHERE! 35mm to 2 1/4 x 3 1/4

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DOUBLE CONDENSER ENLARGER

Fine precision quality model with outstanding PRO features. ALL-METAL. Rack 'n' pinion focusing. HI-FLEX reflector. Complete with baseboard and extra masks.

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With 90mm (3 1/2") f4.5 Amler lens with click-stops 39.75
Enlarging bulb 5.00
Enlarging easel 8.95
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GET TOP VALUE
250mm F4.5

FOLLO-FOCUS LENS
FOCUSING LEVER FOR EXAKTA, NEILAND PENTAX, PENTACON, PRAKTICA, Etc. Not a stove pipe, but a compact precision GERMAN-MADE focusing Telephone with aperture stops from f4.5 to f32. Follo-Focus lever gets moving action in focus instantly.

PRE-SET DIAPHRAGM
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Price includes focusing lever.
1.50 postage and handling
400mm (15.5 Follo-Focus 79.95
10% DOWN—SWAPS, YES

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WITH F1.5 LENS

- SPOOL LOADING 100 ft. FILM
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MOVIE IN A ROOM

(Continued from page 112)

close to it. With either type of light, use a somewhat faster color film than for normal shooting conditions. With bounce light use Kodachrome II (Type A, E.I. 40) for 8 and 16mm cameras, or Anscochrome (Tungsten, 32) or Ektachrome ER (Type B, 125). For window light use Kodachrome II (Daylight, 25), or Moviechrome (Daylight, 20).

If you use sunlight coming through a window, as we did for shots on pages 112 and 113, we'd also suggest a faster color film.

Props—toys, for example—play an important part in keeping action and interest alive. But don't force props on the child. Let him find them himself.

Now for one of the most important aspects of shooting youngsters—good use of your lens equipment. You can get excellent results if you have one lens, three different lenses, or a zoom lens.

The sequence of sequences

The key is a change of framing and camera-to-subject distance for each shot. For example, we start off with an overall view of the boy in the photo top page 113. This establishes the scene. We chose to shoot from a position on the stairs above the living room to add visual interest. Then we let Terry take over. He went from one thing to another, and we followed him.

For example, he discovered the rocking horse. Since the horse was shown right in the middle of the long shot there was no need to establish its shape again. So we moved in for a close-up, followed it with a second from a different angle, and then cut to a third. A fourth cut is a medium long shot of the youngster on the horse. All the shots were made with a normal lens.

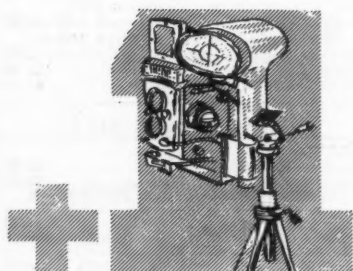
In the pillow shots, B page 112, however, we switched to a tele. Instead of moving in on the scene, we let it come to us. Terry grabbed a pillow off the couch, brought it out to the center of the room, and then lay down on it. Here, it was he who created the change in framing and camera-to-subject distance.

The piano sequence, D page 112, could be shot with a zoom lens. Zoom shots from above the subject make a fresh approach to an effect that is currently in danger of becoming trite through over-use.

Quick cutting, as in the sequences C and E pages 112, 113, is another way to create good footage. But quick cuts should be mixed with more leisurely paced footage.

As you can see, letting the child take over—within limits subtly imposed by the cameraman—can be an effective way to shoot better movies.—M.A.M.

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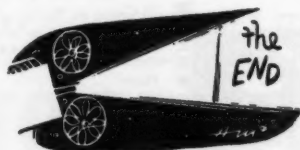
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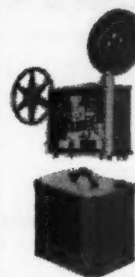
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Classified Want Ads may be inserted in MODERN PHOTOGRAPHY by any reliable individual, camera dealer, or specialty house. To avoid chance of error, submit copy typed. Terms: 70¢ a word. Each word including each item in the address, counts as one word. 10¢ additional for each word in Capital letters. Send cash with order. 5% discount for 6 consecutive insertions, 10% discount for 12 consecutive insertions, if entire bill is paid in advance. Forms close on the 15th of the third month preceding date of issue. For example: Oct. 15th is deadline for Dec. issue.

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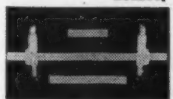
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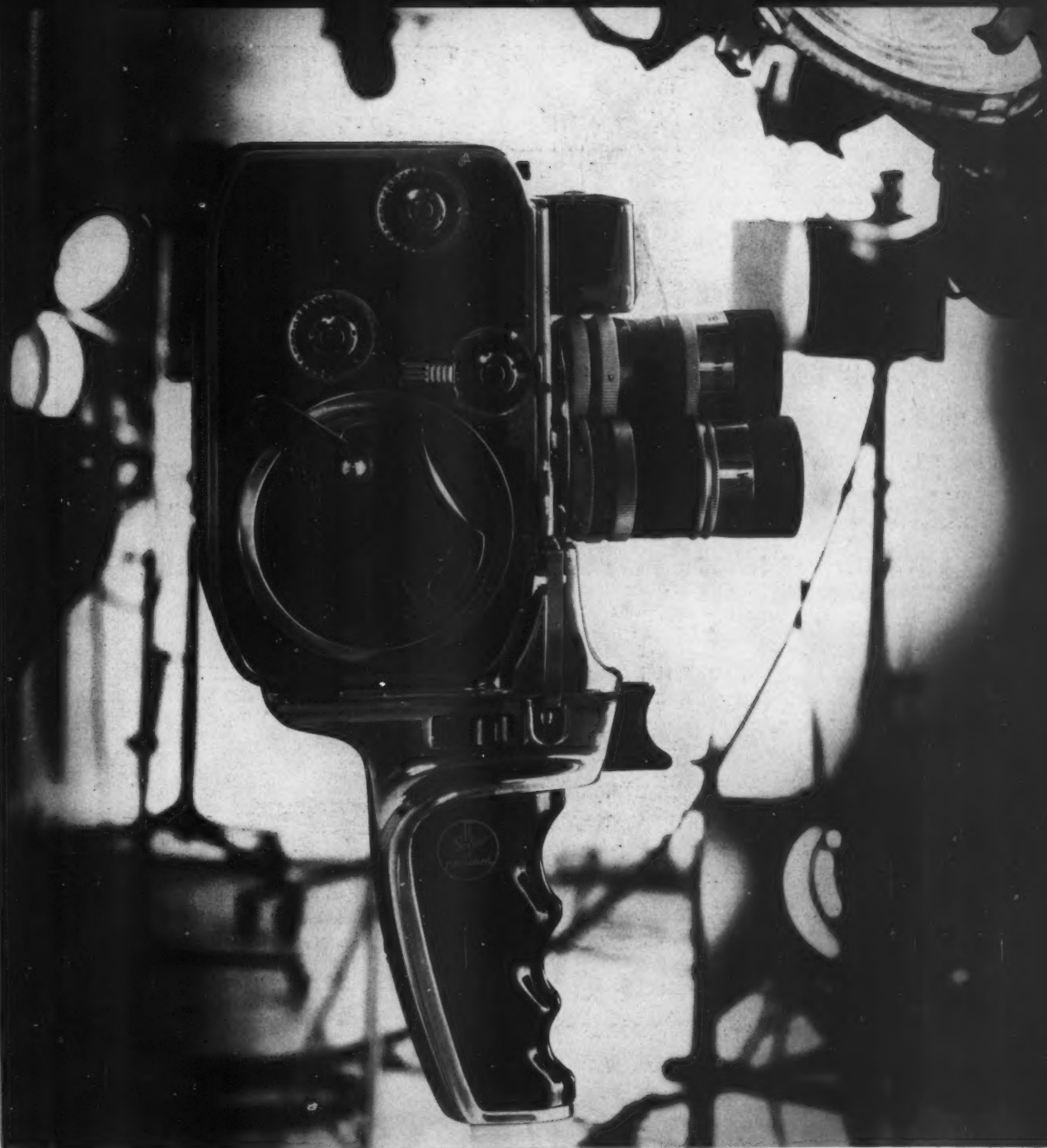
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